

A Stereo-Atlas of Ostracod Shells

edited by R. H. Bate, J. W. Neale, Lesley M. Sheppard
and David J. Siveter

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Contributions illustrated by scanning electron micrographs of Ostracoda in stereo-pairs are invited. Format should follow the style set by the majority of papers in this issue. Descriptive matter apart from illustrations should be cut to a minimum; preferably each plate should be accompanied by one page of text only. Blanks to aid in mounting figures for plates may be obtained from any one of the Editors or Editorial Board. Completed papers should be sent to Dr David J. Siveter.

The front cover shows a male right valve and soft parts, internal view, of
Caboncypris nunkieri De Deckker, 1982

ON TALLINNELLINA DISSITA SCHALLREUTER & SIVETER sp. nov.

by R. E. L. Schallreuter and David J. Siveter
(University of Hamburg, West Germany and University of Leicester, England)

Tallinnellina dissita sp. nov

Holotype: Brit. Mus. (Nat. Hist.) no. OS 6698, ♀ RV.

[Paratypes: Brit. Mus. (Nat. Hist.) nos. OS 6699, 6670, 6692, 6693, 6852. Geologisch-Paläontologisches Institut, University of Hamburg, nos. 2344, 2325].

Type locality: Old quarry about 300 m south of Cum Agol Farm, near Llandeilo, Dyfed, Wales; approx. lat. 51° 51' N, long. 4° 05' W (Nat. Grid Ref.: SN 56552070). Llandeilo 'Flags', Llandeilo Series, middle Ordovician.

Derivation of name: Latin *dissitus*, distant, alluding to its geographical and stratigraphical position in comparison with congeneric species.

Figured specimens: Brit. Mus. (Nat. Hist.) nos. OS 6698 (holotype, ♀ RV: Pl. 10, 2, figs. 1-4), OS 6699 (♂ LV: Pl. 10, 2, fig. 5), OS 6692 (♂ RV: Pl. 10, 4, figs. 1, 2, 4), OS 6700 (tecnomorphic RV: Pl. 10, 4, fig. 3), OS 6693 (♀ RV: Pl. 10, 4, fig. 5).

All the figured specimens are from the type locality and horizon.

Explanation of Plate 10, 2

Figs. 1-4, ♀ RV (holotype, OS 6698, 1400 µm long): fig. 1, ext. ant.; fig. 2, ext. lat.; fig. 3, ext. vent. obl.; fig. 4, ext. vent. Fig. 5, ♂ LV, ext. lat. (OS 6699, 1400 µm long).

Scale A (250 µm; × 40), figs. 1-4; scale B (250 µm; × 40), fig. 5.

Diagnosis: Species of *Tallinnellina* with lobes virtually straight and perpendicular to the dorsal border; L1, L3 and L4 reach dorsal border, where they are more or less weakly expanded; L4 broader than L3. L1-L3 and sometimes posterovenital margin of L4 show tendency to become cristate; L1-L2 cristae form V-shape. Connecting lobe bow-shaped, slightly depressed below S2. Velar flange terminates mid-posteriorly, dimorphic: anteriorly and centroventrally wider and more distant from the free margin in the female, forming a simple antrum.

Remarks: The new species shows closest morphological similarity and phylogenetic affinity to *Tallinnellina rara* Sarv (*Eesti NSV Tead. Akad. Geol. Inst. uurimused* 4, 1959) from the upper Lower Ordovician (middle Kunda Stage, B₃β) of Estonia. In general, in both species the lobes are more vertical than in congeneric taxa. Compared to *T. dissita*, in *T. rara* L1 and L2 are weakly curved and weakly oblique to the dorsal border, its lobes lack cristae, and the connecting lobe is straighter, more parallel to the dorsal border and forms a rounded right angle with L4. Furthermore, in *T. dissita* the connecting lobe is depressed below S2 and the velar flange does not extend to the dorsal border but ends abruptly mid-posteriorly. The abrupt mid-posterior termination of the velar flange is characteristic of *Tallinnella* Öpik, 1937 as defined by Jaanusson (*Bull. geol. Instn. Univ. Uppsala*, 37, 344, 1957). The difference between *Tallinnella* and *Tallinnellina* Jaanusson, 1957 is, however, unclear and requires first-hand investigation of the respective type-species.

T. dissita is the youngest known species of the genus and its first representative from the middle Ordovician and from outside Baltoscandia. In addition to species illustrated by Siveter (The Ordovician, In: Bate, R. H. & Robinson (Eds.), A Stratigraphical Index of British Ostracoda, *Geol. Jl.*, 8, 41-56), *T. dissita* is another link between British and Baltoscandian ostracod faunas in the middle Ordovician.

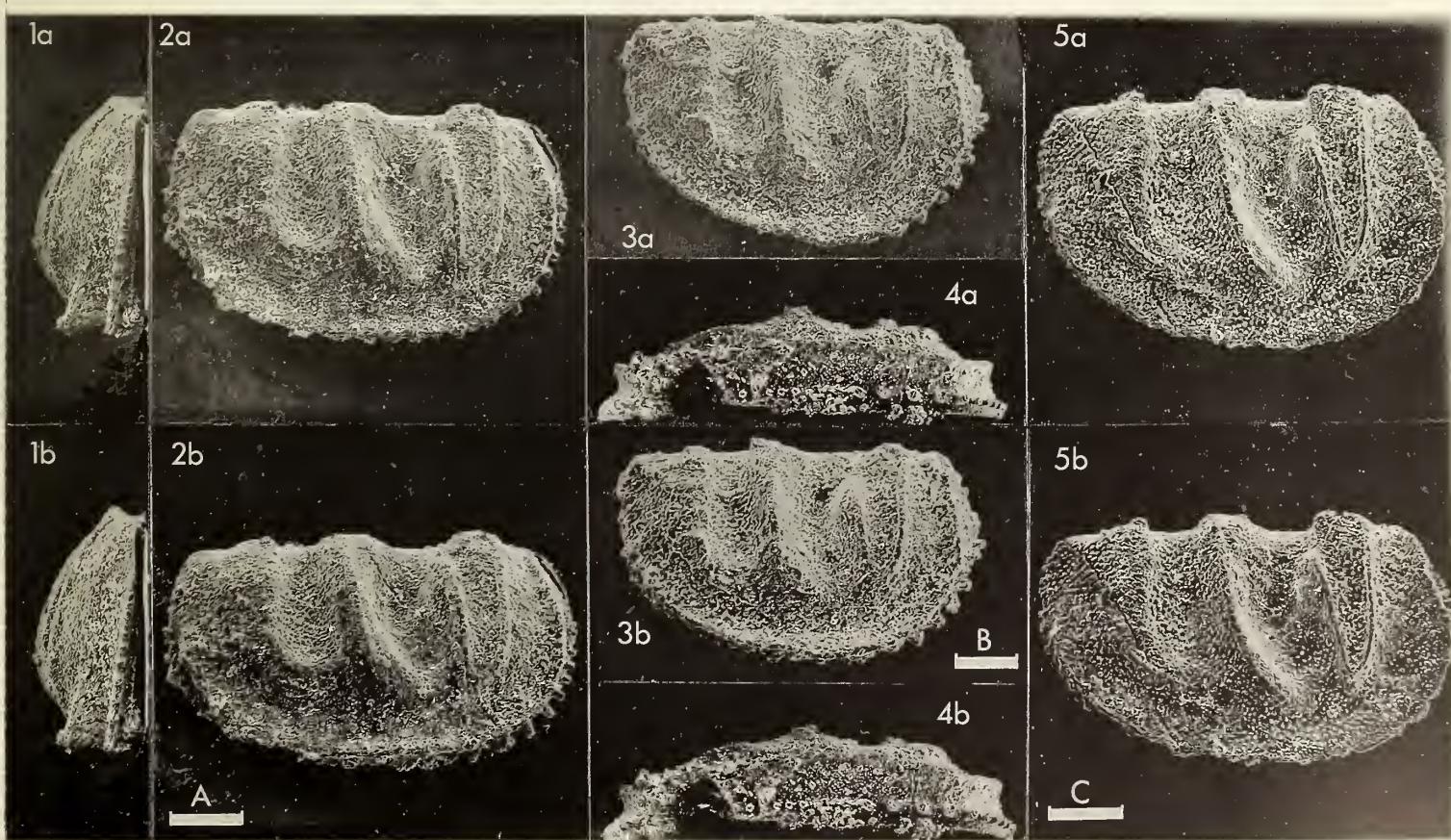
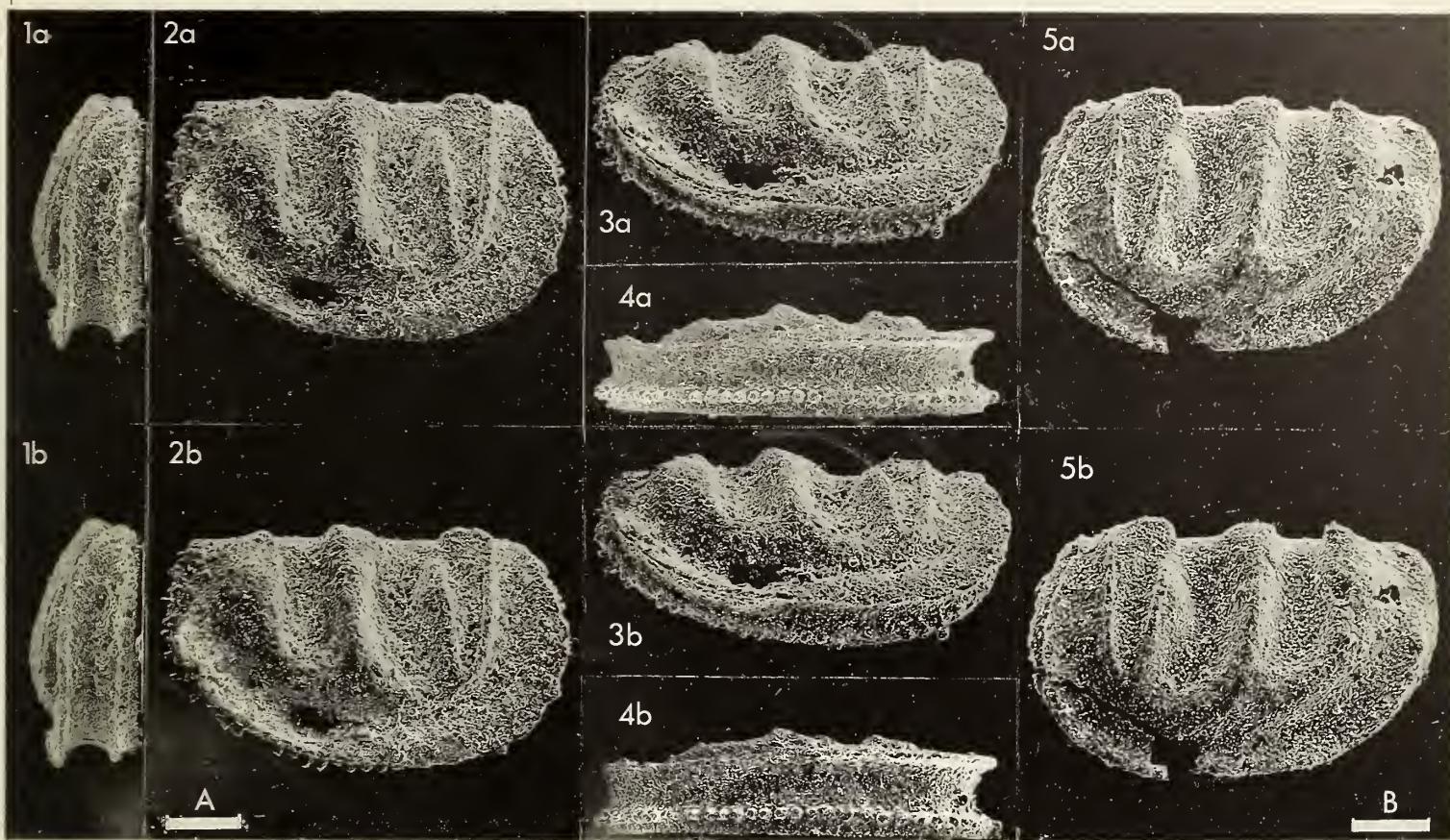
Adult valves are 1.25 – 1.52 mm long.

Distribution: So far known only from the area of the type locality, Wales.

Explanation of Plate 10, 4

Figs. 1, 2, ♂ RV (OS 6692; 1450 µm long): fig. 1, ext. ant.; fig. 2, ext. lat.; fig. 3, tecnomorphic RV, ext. lat. (OS 6700; 1175 µm long); fig. 4, ♂ RV, ext. vent. (OS 6692); fig. 5, ♀ RV, ext. lat. (OS 6693; 1375 µm long).

Scale A (250 µm; × 38), figs. 1, 2, 4; scale B (200 µm; × 40), fig. 3; scale C (250 µm; × 40), fig. 5.





ON HARPEROPSIS SCRIPTA (HARPER)

by C. R. Jones & David J. Siveter
(University of Leicester, England)

Genus HARPEROPSIS Přibyl, 1966

Type-species (by original designation): *Tetradella scripta* Harper, 1947

Diagnosis: Large, amplete, quadrilobate tetradeiid; having short anteroventral connecting ridge (relict histium) between connecting lobe and velum. L2 short, connects near base of L1; L1, L3, L4 strongly developed, ridge like, nearly vertical, projecting above dorsum; L3 with dorsal bifurcation, giving smaller cusp nearer dorsum. Velum as well developed (-inflated) ridge, terminates abruptly mid-posteriorly. Infravelar, anterior-anteroventral antrum; dolon smooth, extends to anterior cardinal corner. Row of spines forming marginal sculpture.

Remarks: *Harperopsis* differs from other genera by its unique connecting ridge between its velum and the connecting lobe. Its prominent, vertical lobes (L1, L3 L4) are also distinctive. The overall morphology of the type-species *Harperopsis scripta* is reminiscent of the ctenonotellid *Tallinnella dimorpha* Öpik (*Publ. Geol. Inst. Univ. Tartu*, **50**, 1937), type-species of the older *Tallinnella* Öpik, 1937. Both *H. scripta* and *T. dimorpha* have a thick velar ridge terminating mid-posteriorly, and anteroventral antra in heteromorphs. *T. dimorpha* differs by the bulbous dorsal terminations of L1, L3, L4, the swollen, granulose base of L1, and by the absence of any histial structure comparable to

Explanation of Plate 10, 6

Figs. 1-6, ♀LV (unnumbered specimen, on same slab as holotype, 2820 µm long): fig. 1, ext. lat.; fig. 2, ext. ant.; fig. 3, obl. vent.; fig. 4, vent.; fig. 5, obl. dors.; fig. 6, dors.

Scale A (500 µm; × 20), figs. 1-6.

Remarks (cont.): the ventral connecting ridge of *H. scripta*. Such a structure (interpreted as a ventral strengthening strut) could have developed by an accretionary process, involving the velum and connecting lobe; in this case a *Tallinnella*-like ancestor could thus be postulated. However, we believe *Harperopsis* is derived from older tetradeiid stock (found in the Llandeilo Series of South Wales and basal Caradoc Series of the Shelve district, Shropshire), which has a histial ridge connected anteroventrally to the velum. Thus, more likely, a reduction of this condition would give rise to the ventral connecting ridge (a relict histial structure) of *Harperopsis*.

Přibyl (*Cas. narod. Mus.*, **135**(4), 201-2, 1966) designated *T. scripta* type-species of his new subgenus *Cerninella* (*Harperopsis*). However, Přibyl's generic diagnosis excludes *H. scripta* as now known. *Beyrichia bohemica* Barrande (*Système Silurien due centre de la Bohême*, **1**, suppl., pl. 26, fig. 13, pl. 34, figs. 19, 20, 1872), type-species of *Cerninella*, differs from *H. scripta* by the lack of a histial structure, its slender L1, L2, L3, and its dorsally reduced L4. Following Siveter (*Geol. J. Spec. Issue*, **8**, 52, 1978), we regard *Harperopsis* as a distinct genus.

We differ with Přibyl's (204, 1966) generic assignment of *T. bicuneiformis* Harper (op. cit. 348-49, pl. 10, figs. 4, 10, text-fig. 1b) to within *C. (Harperopsis)*. This species differs from *Harperopsis* in having a more well defined relict histial ridge, more inclined L3 and L4, and an isolated V-shaped L1-L2. Although *T. bicuneiformis* is closely related to *Harperopsis* (cf. Siveter, 50, 1978), we consider that the species is best assigned to a new tetradeiid genus (C. Jones, in prep).

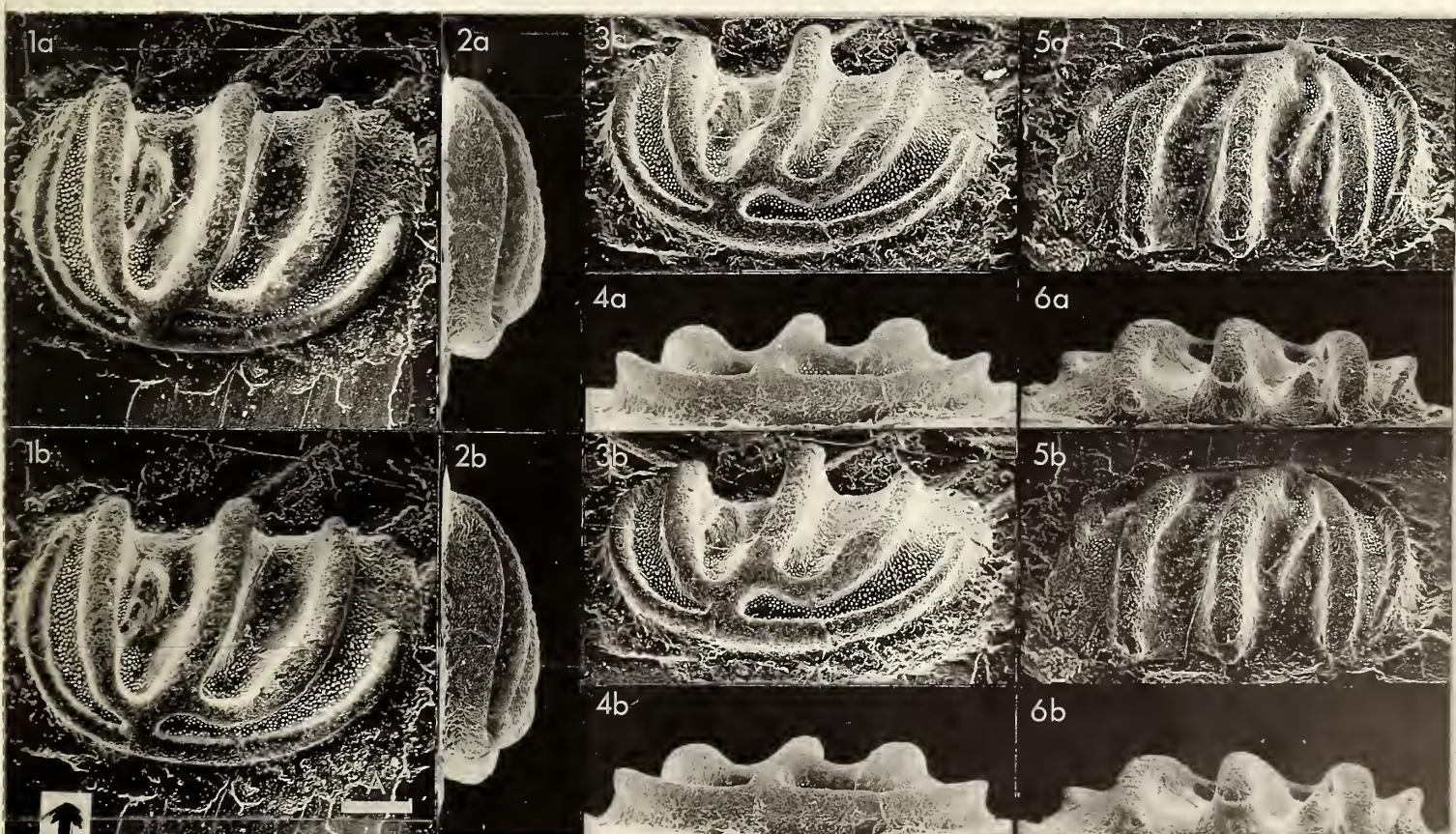
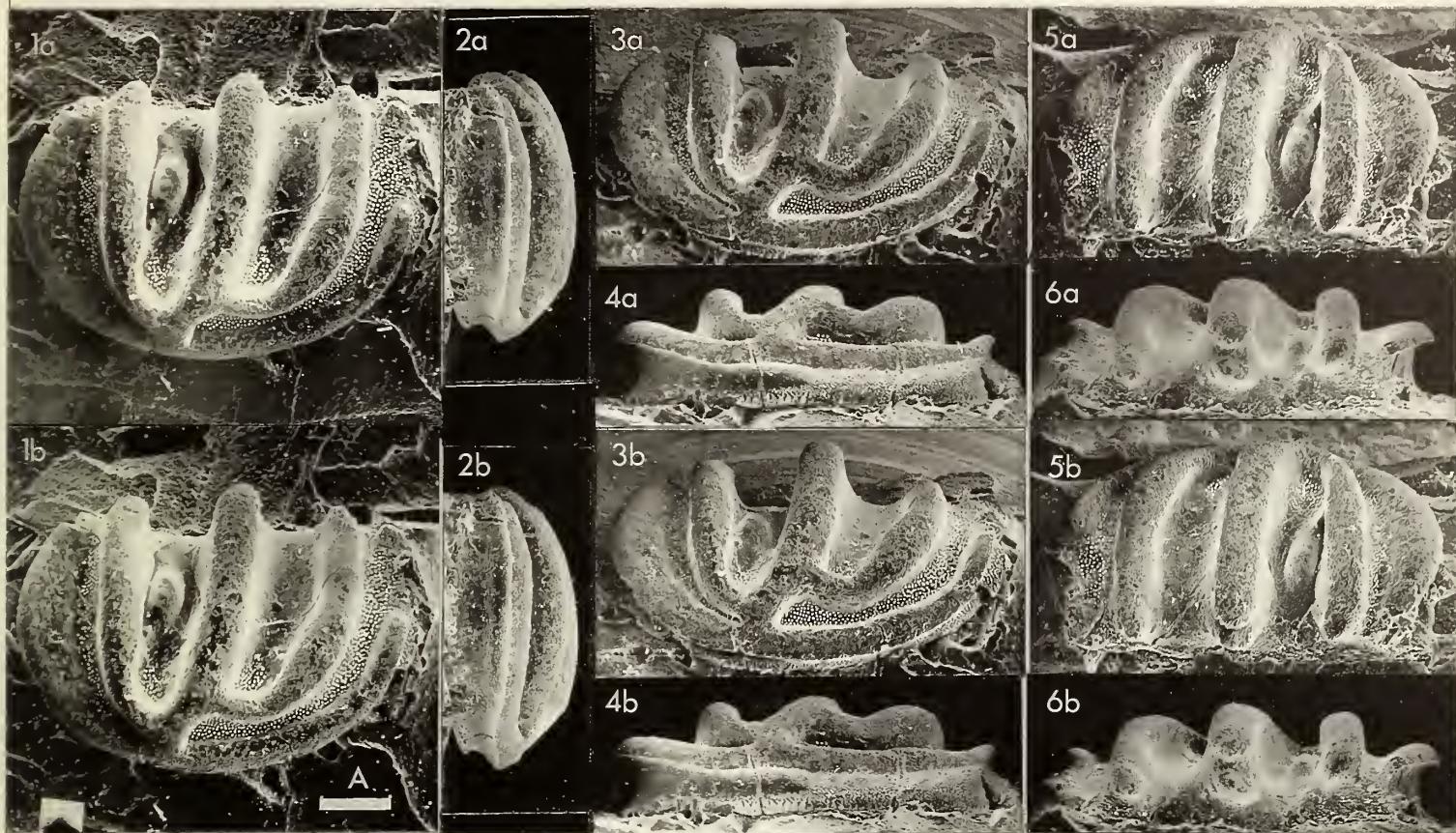
Additional forms referred to *Harperopsis* include *Beyrichia decorata* Jones (*Ann. Mag. nat. Hist.* (2), **16**, 165, pl. 6, fig. 6, 1855) and an additional, undescribed British species.

Distribution: *Harperopsis* is known from the Caradoc Series, middle Ordovician, of Wales and Northern England.

Explanation of Plate 10, 8

Figs. 1-6, ♂LV (holotype, **GSM 74875A**, 2800 µm long): fig. 1, ext. lat.; fig. 2, ext. ant.; fig. 3, obl. vent.; fig. 4, vent.; fig. 5, obl. dors.; fig. 6, dors.

Scale A (500 µm; × 20), figs. 1-6.



Harperopsis scripta (Harper, 1947)

1855 *Beyrichia complicata*, Salter; T. R. Jones, op. cit., 164 (*pars*), pl. 6, fig. 5 (=juvenile on **GSM 49449**).
 1947 *Tetradella scripta* sp. nov.; J. C. Harper, *Geol. Mag.*, **84**, 347, 348 (*pars*), pl. 10, figs. 1, 2, 8, text-fig. 1a.
 1948 *Tetradella scripta* Harper; I. Strachan, J. Temple & A. Williams, *Geol. Mag.*, **85**, 276, 277.
 1953 *Tallinnella scripta* (Harper, 1947); G. Henningsmoen, *Norsk. geol. Tidsskr.*, **31**, 214.
 1964 *Tallinnella scripta* (Harper); *Brit. Mus. Nat. Hist., British Palaeozoic Fossils*, pl. 12, fig. 11, London.
 1966 *Cerninella (Harperopsis) scripta*, Harper, 1947; A. Přibyl, op. cit., 201, 202.
 1978 *Harperopsis scripta* (Harper, 1947); D. J. Siveter, op. cit., 52, pl. 3, figs. 7, 8.

Holotype: Institute of Geological Sciences Museum, London, no **GSM 74875A**; ♂LV, external mould.
Type locality: 150 m E of Cwms Cottage, 0.5 km SE of Caer Caradoc Hill, Church Stretton, Shropshire (Grid Ref. SO 4816 9493); approx. lat. 52° 32' N, long. 2° 46' W. Harnage Shales, Harnagian, Caradoc Series, middle Ordovician.
Figured specimens: Institute of Geological Sciences, nos. **GSM 74875A** (holotype, ♂LV; Pl. 10, 8, figs. 1-6; Pl. 10, 12, figs. 1-4); unnumbered specimen on same slab as holotype (♀ LV; Pl. 10, 6, figs. 1-6; Pl. 10, 10, figs. 1-3). Both from the type locality and horizon.
 The figured specimens (Siveter, 1978, pl. 3, figs. 7, 8) are 'Silcoset' silicone rubber casts of external moulds.

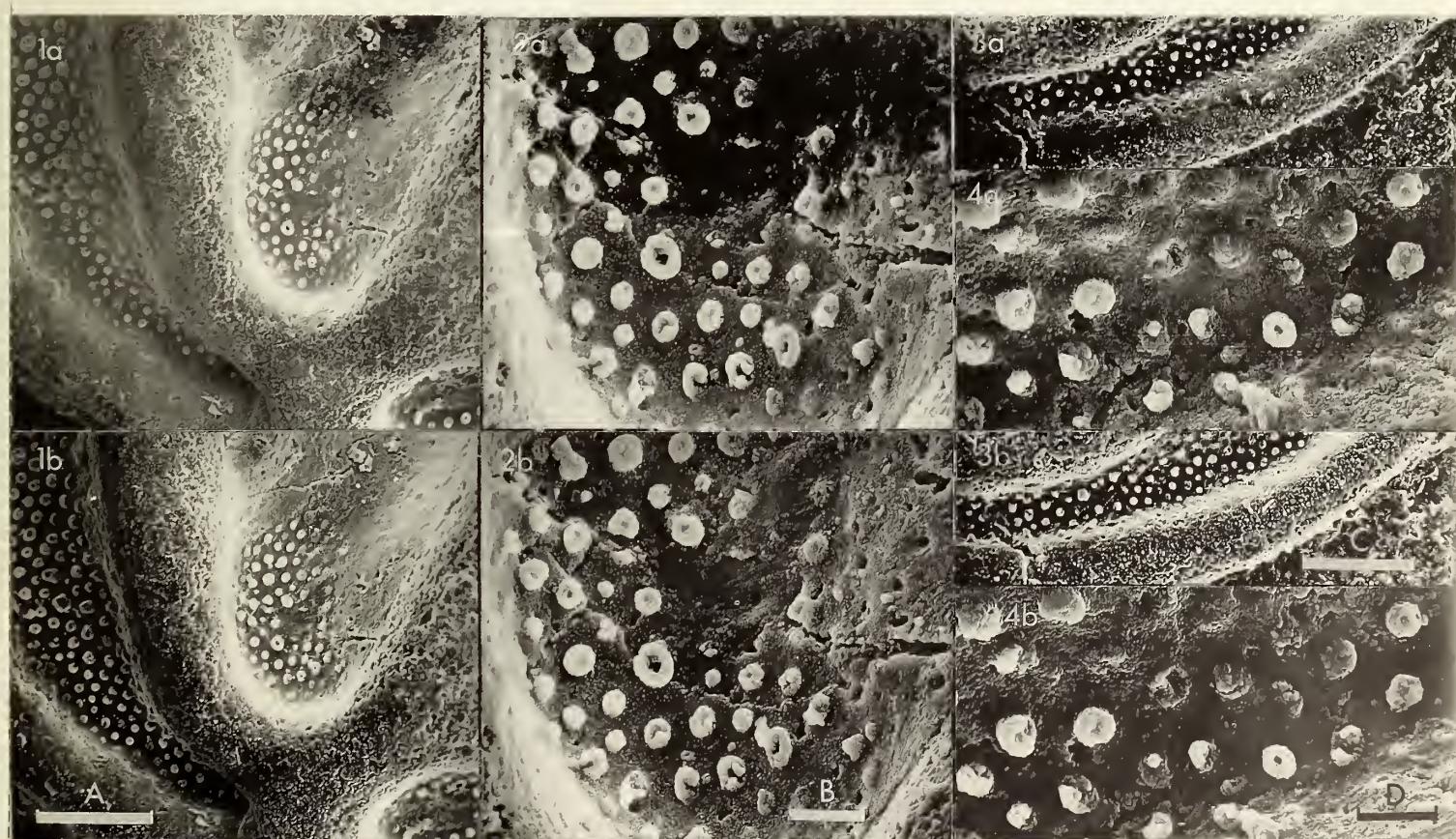
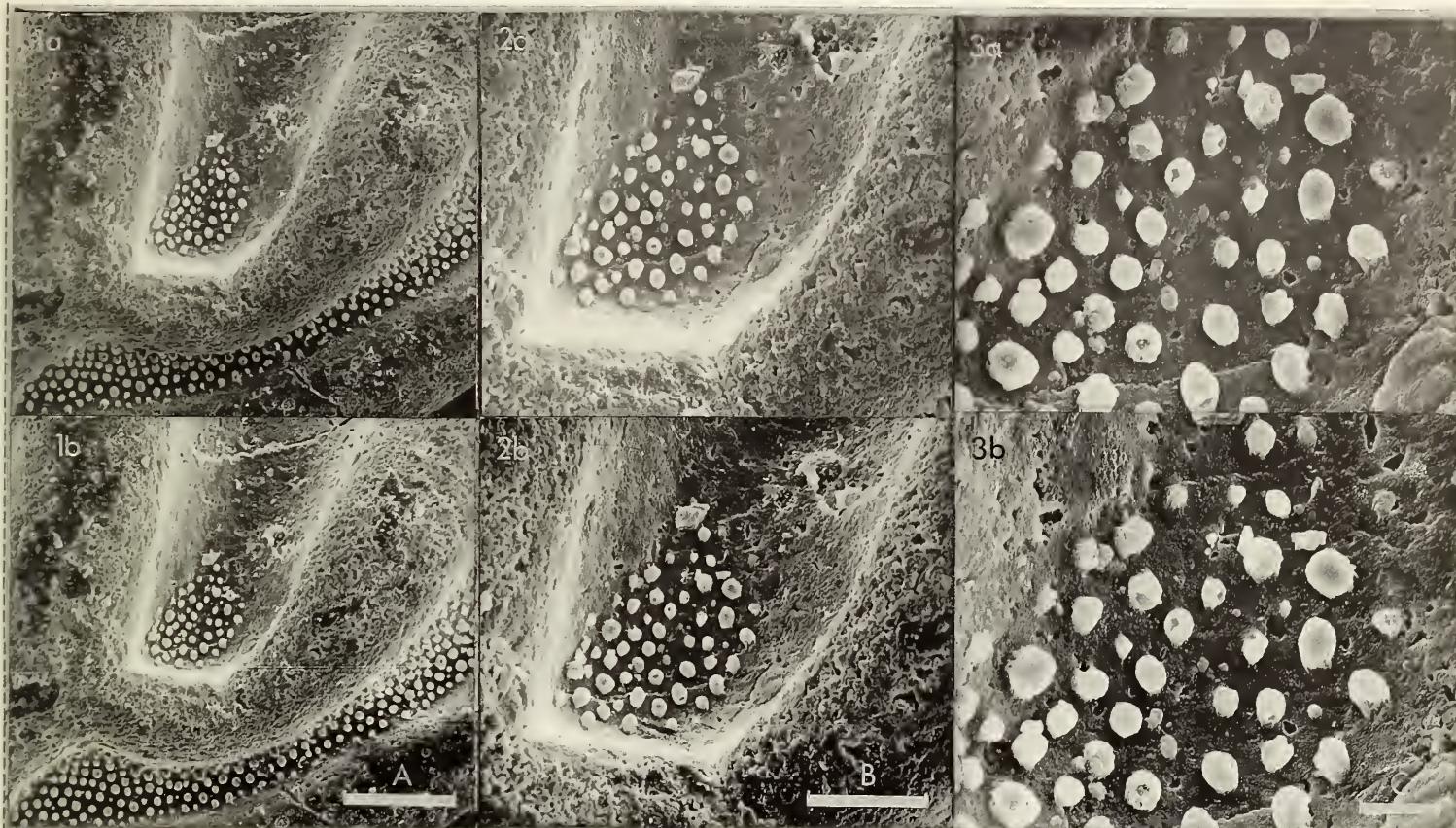
Explanation of Plate 10, 10

Figs. 1-3, ♀LV (unnumbered specimen, on same slab as holotype): ornament (granules with pores) at base of S3.
 Scale A (250 µm; × 64), fig. 1; scale B (125 µm; × 120), fig. 2; scale C (25 µm; × 424), fig. 3.

Diagnosis: Large *Harperopsis* having diminutive L2. Dolon, velar ridge, lobal crests and all but ventral-most parts of sulci smooth; granulose elsewhere. Left valve with almost entire inner semi-groove; complementary marginal flange on right valve.
Remarks: Harper (347, 348, 1947) placed *H. scripta* in *Tetradella* on the basis of its lobation, but did not recognise its dimorphism. None of the six species he assigned to *Tetradella* would now belong within the genus.
 Intraspecific variation in *H. scripta* consists of flattened to semi-cristate L2, and ridge-like to swollen base of L4. Juveniles have fimbriate L3, and more cristate-like lobation.
H. decorata differs from *H. scripta* by its inflated velum, reduced lobation but with L1, L3, L4 bulbous dorsally, and the obsolescence of lobal bifurcation to L3.
Distribution: The Harnage Shales, Harnagian, Caradoc Series, Shropshire, England. Dean (*Bull. Brit. Mus. Nat. Hist. (Geol.)*, **3** (6), 218-220, 1958) also records *H. scripta* from the Costonian, Harnagian and Soudleyan of the Caradoc Series of Shropshire, but those occurrences have not yet been confirmed.
H. scripta is one of the most commonly quoted ostracodes in British Ordovician faunal lists, but undoubtedly most of these records should be treated with caution as most probably they refer to other forms of quadrilobate palaeoecopes.

Explanation of Plate 10, 12

Figs. 1-4, ♂LV (holotype, **GSM 74875A**): ornament (granules with pores) at base of S2 (figs. 1, 2) and ventral supra-velar region (figs. 3, 4).
 Scale A (250 µm; × 64), fig. 1; scale B (50 µm; × 200), fig. 2; scale C (250 µm; × 64), fig. 3; scale D (32 µm; × 310), fig. 4.



ON VITTELLA FECUNDA SIVETER sp. nov.

by David J. Siveter
(University of Leicester, England)

Vittella fecunda sp. nov.

1963 *Lomatobolbina* sp.; N. Spjeldnaes, *Palaeontology*, 6, 258, pl. 36, fig. 8.
1978 *Lomatobolbina* sp. nov. 1; D. J. Siveter, *The Ordovician, In: Bate, R. H. & Robinson, E. (Eds.), A Stratigraphical Index of British Ostracoda, Geol. Jl.*, special issue 8, 48, pl. 1, figs. 11, 12.

Holotype: Brit. Mus. (Nat. Hist.) no. OS 7777, ♀ LV.
Type locality: Old quarry about 300 m south of Cwm Agol Farm, near Llandeilo, Dyfed, Wales; approx. lat. 51° 51' N, long. 4° 05' W (Nat. Grid Ref. SN 56552070). Llandeilo 'Flags', Llandeilo Series, middle Ordovician.
Derivation of name: Latin *fecundus*, fertile; alluding to the well developed dolon ('brood pouch') in the females.
Figured specimens: Brit. Mus. (Nat. Hist.) nos. OS 7777 (holotype, ♀ LV: Pl. 10, 14, fig. 1), OS 7778 (♂ RV: Pl. 10, 14, figs. 2, 3; Pl. 10, 16, fig. 5), OS 7779 (♀ LV: Pl. 10, 14, fig. 4), OS 7782 (tecnomorph RV: Pl. 10, 16, figs. 1-3), OS 6672 (♀ LV: Pl. 10, 16, fig. 4), OS 7781 (Pl. 10, 16, fig. 6).
All the figured specimens are from the type locality and horizon.
All material occurs as silicified valves.

Explanation of Plate 10, 14

Fig. 1, ♀ LV, ext. lat. (holotype, OS 7777, 1450 µm long); fig. 2, ♂ RV, ext. lat. (OS 7778, 1350 µm long); fig. 3, ♂ RV, ext. post. (OS 7778); fig. 4, ♀ LV, ext. lat. (OS 7779, 1330 µm long).
Scale A (250 µm; × 38), fig. 1; scale B (250 µm; × 40), figs. 2-4.

Diagnosis: Species of *Vittella* with supra-velar furrow well developed throughout, and a weak perimarginal ridge occurring (at least in females) between dolonal edge and valve margin along most of the antrum. S2 narrow, sigmoidal, narrowing and weaker ventrally; above, a faint elevation near dorsum. L2 node like; L3 broad with variously developed ventral node (-spine). Velum frill-like, widest anteriorly and ventrally, gradually reduced to posterior mid-height; extended into wide, convex anterior-ventral dolon.

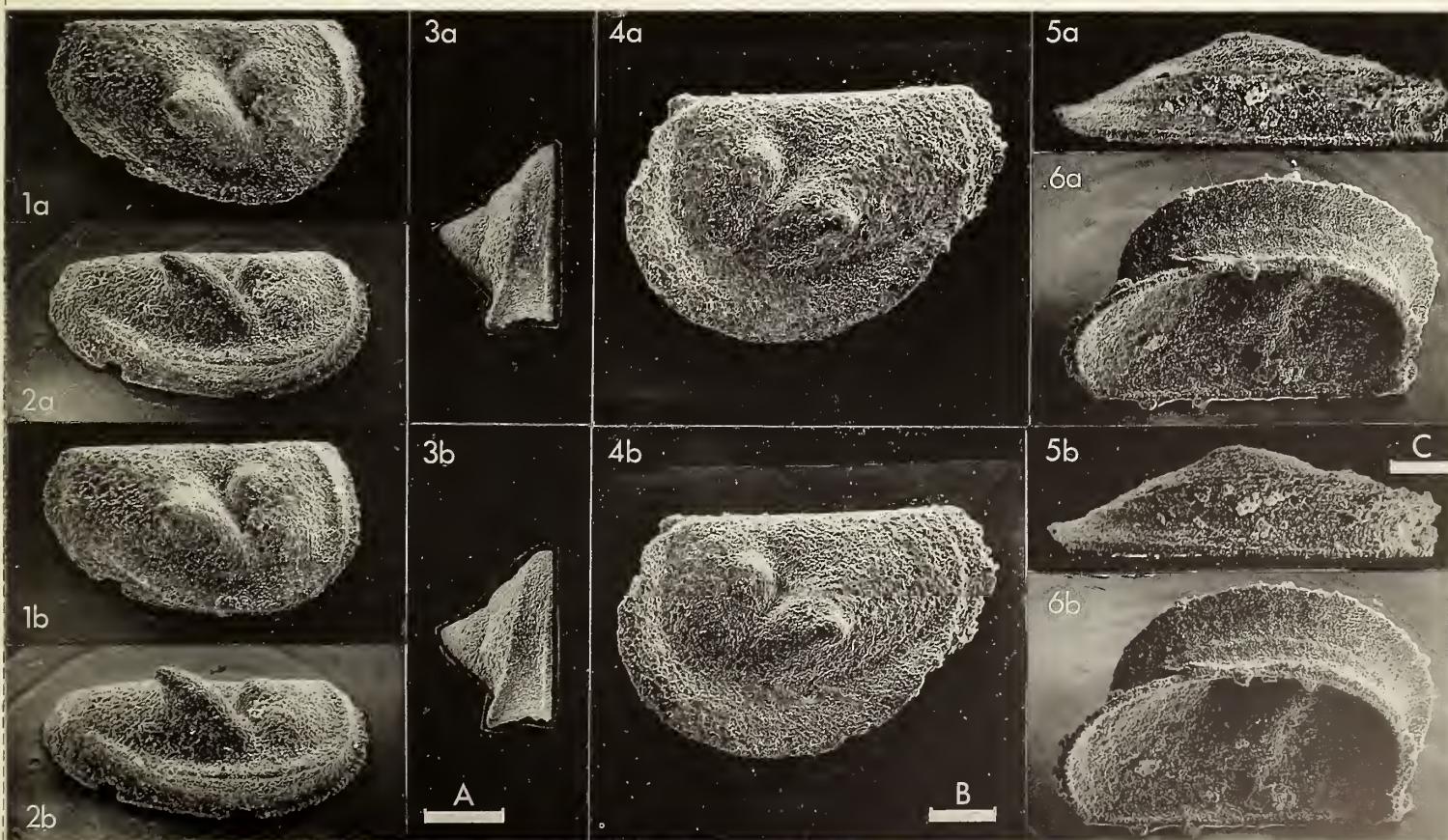
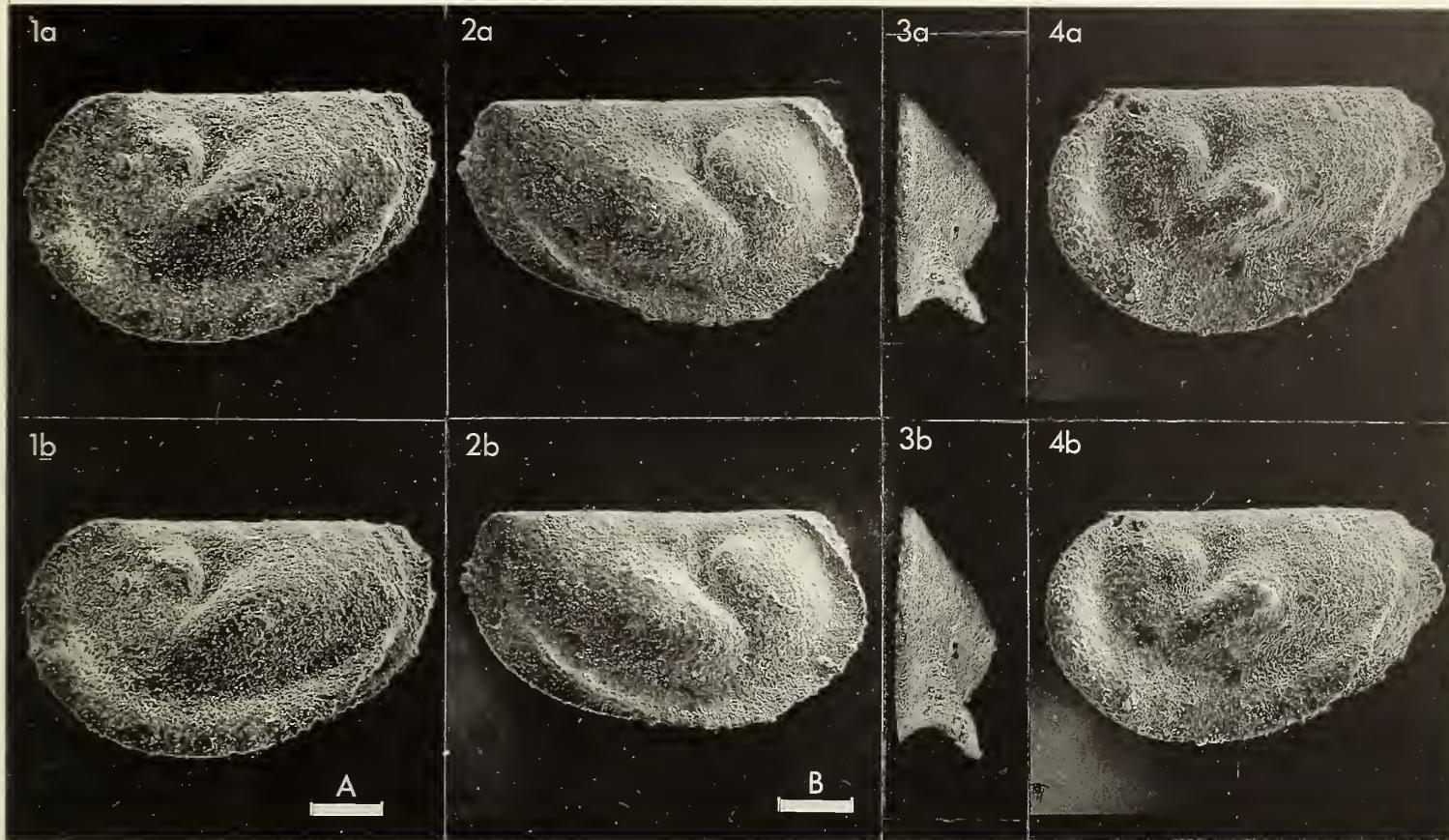
Remarks: Siveter (op. cit.) temporarily assigned this species to *Lomatobolbina* Jaanusson, 1957. The faint antral ridge is here confirmed (in many though not all females) and re-interpreted as a weak perimarginal ridge and the main adventral structure is reinterpreted as a velum, not a histium. *Vittella* is a glossomorphitine, tetradeellids in which the histium can be obsolete. *V. fecunda* differs from the middle Ordovician Baltoscandian type-species, *V. vittensis* Schallreuter (*Ber. geol. Ges. DDR*, 2, 1964), and from the Siberian *V. rogeri* (Ivanova & Melnikova) (*Palaont. Ž*, 11, 1977) by having a perimarginal ridge and by its wider dolon in lateral view. The middle Ordovician *V. rogeri* (op. cit., 87, text-fig. 2) appears to be closely similar to *V. fecunda* but differs further by its apparently thicker adventral structure and in having its S2 slightly wider ventrally. Even amongst material etched from a single block of limestone *V. fecunda* displays wide infraspecific variation, particularly in the size of adults (♀: c. 1050-1450 µm) and in the development of the L3 node, which in extreme cases is either spine-like or absent.

Vittella is one of the many ostracode genera (e.g. *Homeokiesowia*, *Tallinnellina*, *Cryptophyllus*) now known to be common to both southern Britain and the Baltic area in the middle Ordovician (e.g. see Siveter, 1978; *Stereo-Atlas of Ostracod Shells*, 9, 89, 1983; Schallreuter & Siveter *Ibid.*, 9, 85, 1983).

Distribution: Known only from the area of the type locality, South Wales.

Explanation of Plate 10, 16

Figs. 1-3 tecnomorphis RV (OS 7782, 875 µm long); fig. 1, ext. lat.; fig. 2, obl. vent.; fig. 3, ext. ant.; fig. 4, ♀ LV, ext. lat. (OS 6672, 1270 µm long); fig. 5, ♂ RV, ext. vent. (OS 7778); fig. 6, ♀ RV, int. vent. obl. (OS 7781, 1280 µm long).
Scale A (250 µm; × 50), figs. 1-3; scale B (250 µm; × 40), figs. 4, 6; scale C (250 µm; × 40), fig. 5.



ON SARLATINA MERLENSIS BABINOT & COLIN

by J. P. Colin
(Esso Production Research-European Lab., Bègles, France)

Genus *SARLATINA* Babinot & Colin, 1976

Type-species (by original designation): *Sarlatina merlensis* Babinot & Colin, 1976

Diagnosis: Carapace ovoid, more or less elongate, smooth with rather numerous sieve-pores. Weak, subvertical post-ocular sulcus present. Left valve larger than right; hinge antimerodont. Small anterior vestibulum present. Strong sexual dimorphism, with males more elongate and females slightly swollen posteriorly. About 60 marginal pore canals., straight or sinuous.

Remarks: The monotypic genus *Sarlatina* is thought to be a descendant of the Jurassic to Early Cretaceous genus *Fabanella* Martin and the ancestor of the Cenozoic to Recent genus *Cyprideis* Jones. Its occurrence generally in mono- to oligospecific associations suggests its preference for brackish environments.

Explanation of Plate 10, 18

Fig. 1, ♀ car., ext. rt. lat. (8215-16, 920 µm long); fig. 2, ♀ LV, ext. lat. (8217-18, 940 µm long); fig. 3, ♂ LV, int. lat. (8221-22, 930 µm long).

Scale A (250 µm: × 58), figs. 1-3.

Sarlatina merlensis Babinot & Colin, 1976

1963 *Fabanella?* sp. H. J. Oertli, *Mesozoic Ostracod Faunas of France*, Edit. E. J. Brill, pl. 78, 2e; pl. 89, 1-2, Leiden.

1976 *Sarlatina merlensis* n. sp.; J. F. Babinot & J. P. Colin, *Abh. Verh. naturwiss. Ver. Hamburg* (NF), 18/19 (Suppl.), 164-168, pl. 2, figs. 8-17, pl. 3, figs. 1-12.

Holotype: Unnumbered specimen, deposited in the collections of the Laboratoire de Micropaléontologie, Université Pierre et Marie Curie, Paris; ♂ carapace.

Type-locality: Borehole of Merle, village of Berbiguières, near St. Cyprien, Dordogne, SW France; approx. lat. 44° 50' N, long 1° 03' W. Cenomanian, Cretaceous.

Figured specimens: EPR-E 8215-16 (♀ car.: Pl. 10, 18, fig. 1), 8217-18 (♀ LV: Pl. 10, 18, fig. 2), 8221-22 (♂ LV: Pl. 10, 18, fig. 3), 8227-28 (♂ car.: Pl. 10, 20, fig. 1), 8225-26 (♂ RV: Pl. 10, 20, fig. 2). 8260 (♂ car.: Pl. 10, 20, fig. 3).

All the specimens are from the Middle Cenomanian marginal-marine sediments of Cacem, NW of Lisbon, Portugal, approx. lat. 38° 47' N, long. 9° 13' W; coll. by Dr P. Y. Berthou (*Mem. Serv. geol. Portugal*, no. 23, 1973).

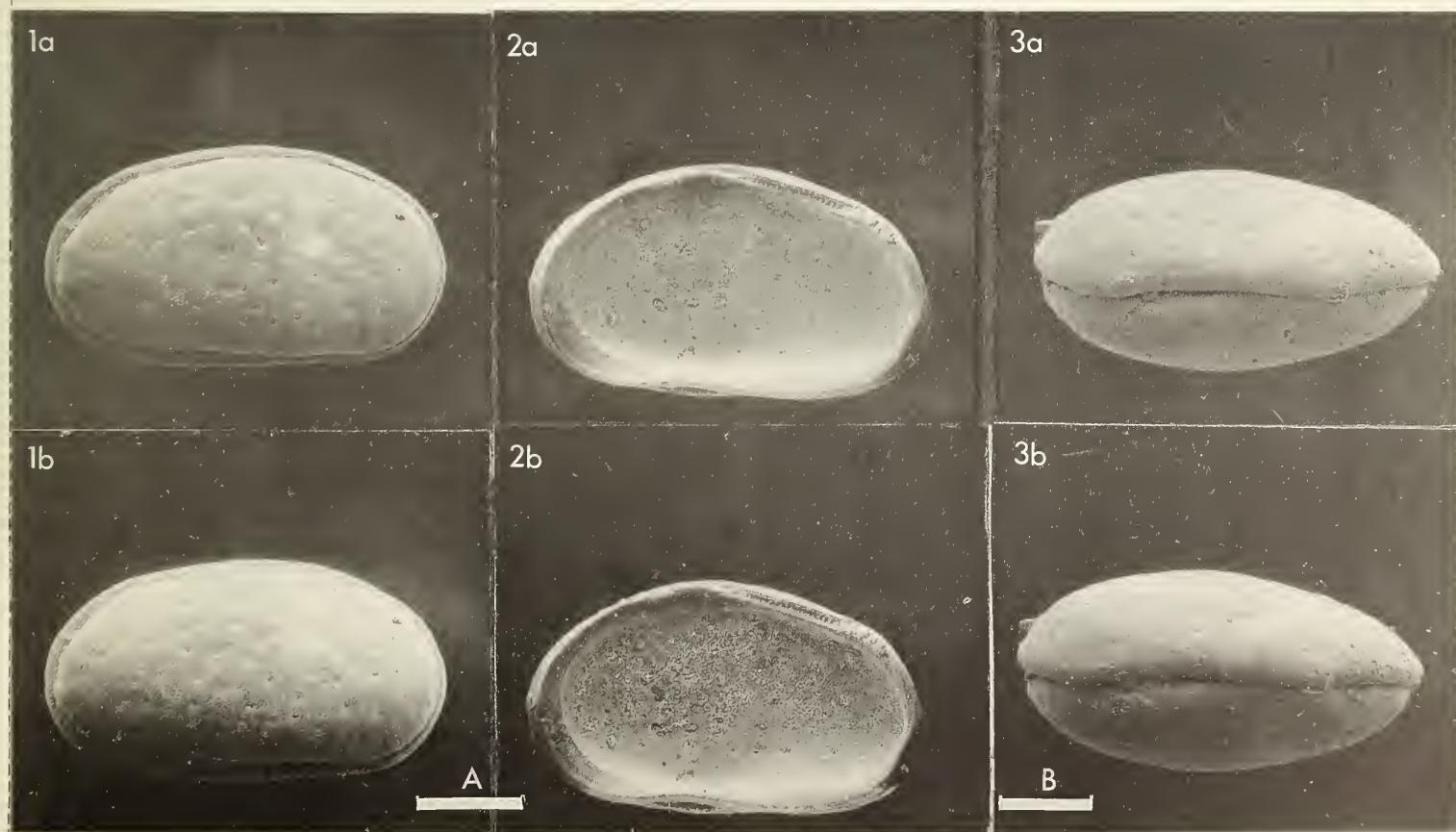
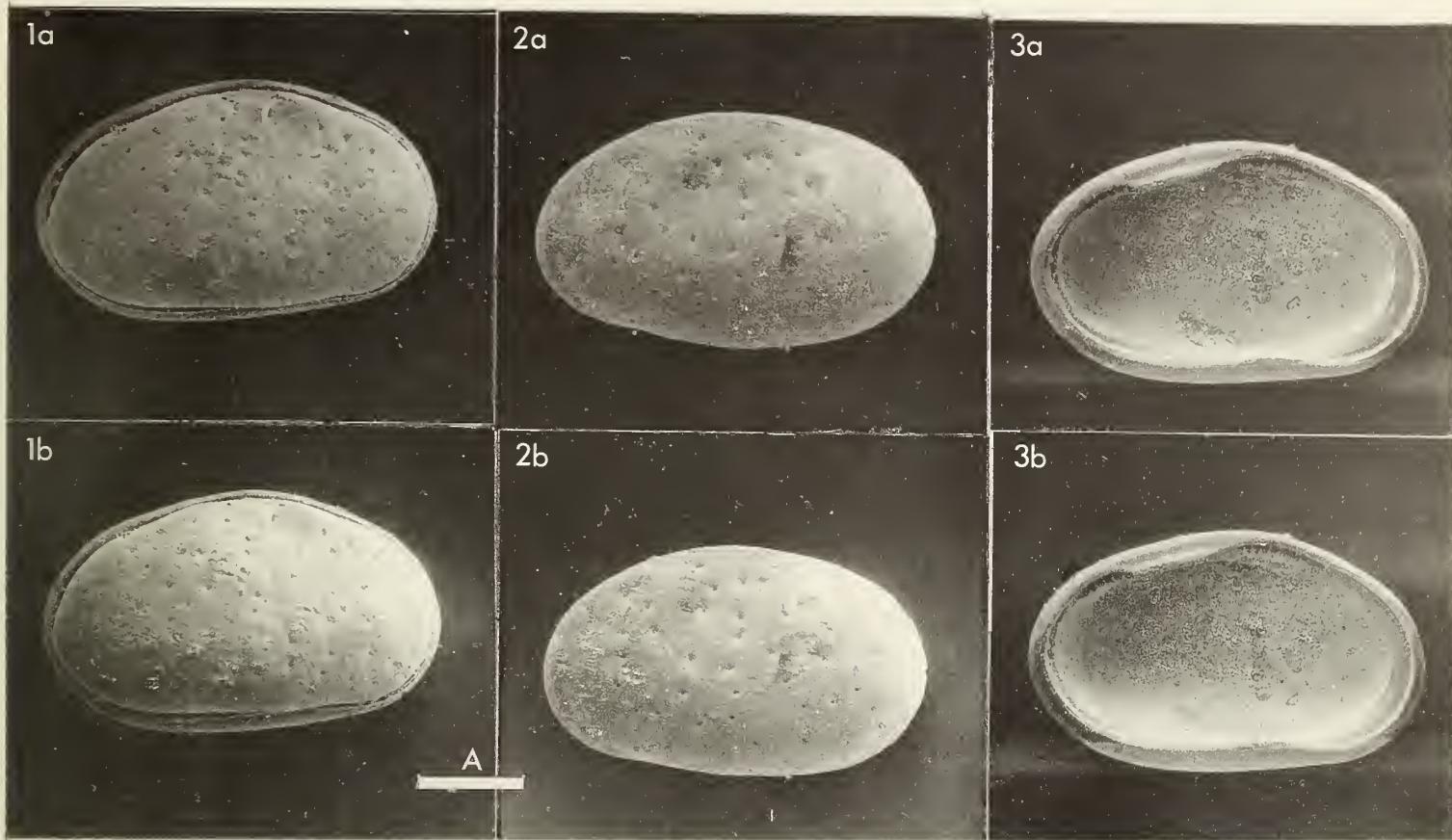
Diagnosis: As for the genus.

Distribution: Cenomanian of SW France, Spain, Portugal and North Africa.

Explanation of Plate 10, 20

Fig. 1, ♂ car., ext. rt. lat. (8227-28, 1122 µm long); fig. 2, ♂ RV, int. lat. (8225-26, 940 µm long); fig. 3, ♂ car., ext. dors. (8620, 957 µm long).

Scale A (250 µm; × 49), fig. 1; scale B (250 µm; × 58), figs. 2, 3.



ON REGINEA REGINAE SCHALLREUTER gen. et sp. nov.

by Roger E. L. Schallreuter
(University of Hamburg, German Federal Republic)

Genus *REGINEA* gen. nov.

Type-species: *Reginea reginae* sp. nov.

Derivation of name: In honour of Regine Heidenreich, Planegg near Munich, German Federal Republic.

Diagnosis: Very small (less than 0.5 mm) binodiscope, more or less amplete, with three nodes. One node in front of S2 at the dorsal border, one node in the anteroventral region and one node in the center of the postadductor area. Border between lateral and marginal surface forms a ridge-like pseudovelum reducing in width in dorsal direction anteriorly and posteriorly. Lateral surface, including nodes, coarsely reticulate.

Remarks: *Reginea* is very similar to *Klimphores* Schallreuter, 1966 (*Stereo-Atlas of Ostracod Shells*, 7 (1), 1980) and related genera, especially *Laterophores* Schallreuter, 1968 (*Ber. deutsch. Ges. geol. Wiss. A* 13, 2), *Vaivanovia* Schallreuter, 1966 (*Ibid.* 11, 3), *Bullaferum* Qvale, 1980 (*Norsk geol. Tidsskr.*, 60, 2) and *Warthinia* Spivey, 1939 (*J. Paleont.*, 13, 2). The new genus is distinguished particularly by the central position of its posterior node.)

Explanation of Plate 10, 22

Fig. 1, RV, ext. lat. (holotype, GPIMH 2712, 373 µm long); fig. 2, LV, ext. lat. (paratype, GPIMH 2713, 366 µm long).
Scale A (100 µm; × 260), figs. 1, 2.

Reginea reginae sp. nov.

Holotype: Geologisch-Paläontologisches Institut und Museum, University of Hamburg, no. 2712, RV.
[Paratypes: nos. 2713–2715].

Type locality: Upper Harjuan (Upper Ordovician) Öjlemyrflint erratic boulder no. Sy100 of the Upper Kaolinsand (Lower Pleistocene) near Braderup, Isle of Sylt (N Frisian Is., N Sea), Germany; lat. 54° 56' N, long. 8° 21' E.

Derivation of name: As for the genus.

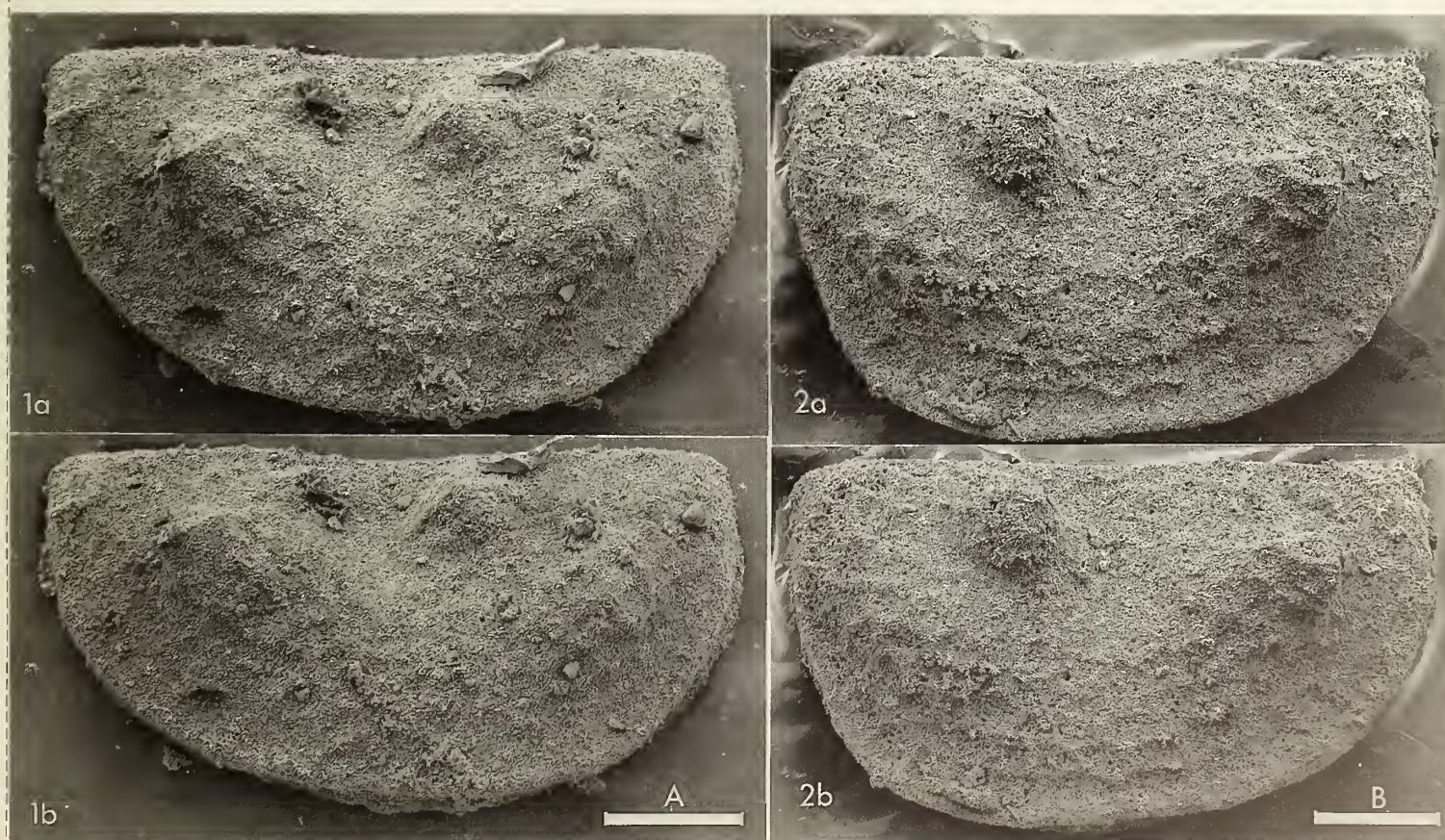
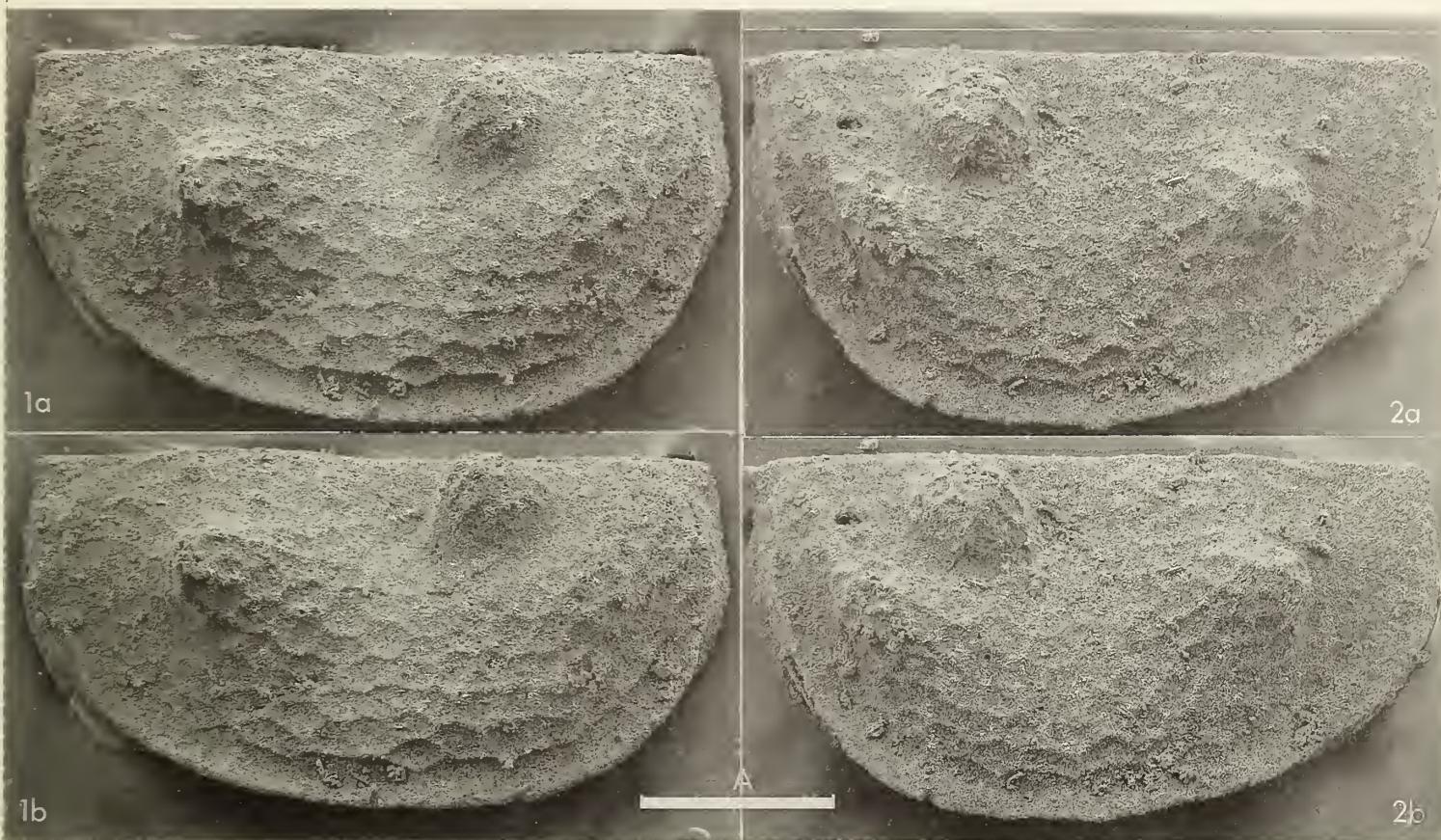
Figured specimens: Geologisch-Paläontologisches Institut und Museum, University of Hamburg (GPIMH) nos. 2712 (holotype RV: Pl. 10, 22, fig. 1), 2713 (LV: Pl. 10, 22, fig. 2), 2716 (juv. RV: Pl. 10, 24, fig. 1) and 2714 (juv. LV: Pl. 10, 24, fig. 2). Nos. 2712–2714 are from the type locality; boulder coll. by Ulrich von Hacht, Hamburg, in 1980. No. 2716 is from the Öjlemyrflint erratic boulder no. Wie 1 from Wielen near Uelsen, West Germany; lat. 52° 32.5' N, long. 6° 44' E; coll. by F. Rhebergen, Schoonebeek, Netherlands, in 1982.

Diagnosis: As for the genus.

Distribution: Known from Upper Harjuan (Upper Ordovician) Öjlemyrflint erratic boulders of Schleswig-Holstein (Isle of Sylt) and Niedersachsen (Wielen).

Explanation of Plate 10, 24

Fig. 1, juv. RV, ext. lat. (GPIMH 2716, 250 µm long); fig. 2, juv. LV, ext. lat. (paratype, GPIMH 2714, 268 µm long).
Scale A (50 µm; × 380), fig. 1; scale B (50 µm; × 330), fig. 2.



ON BROMIDELLA SARVI SCHALLREUTER

by Roger E. L. Schallreuter
(University of Hamburg, German Federal Republic)

Bromidella sarvi Schallreuter, 1964

1964 *Bromidella sarvi* sp. n. R. E. L. Schallreuter, *Ber. geol. Ges. DDR*, 9, (3), 389, 390, 430, pl. 13 (431), fig. 2.
1973 *Bromidella sarvi* Schallreuter; R. E. L. Schallreuter, *Palaeontographica*, (A), 144 (1/3), 79, 86-88, text-fig. 18, pl. 20, figs. 1-6, tab. 10. (q.v. for further synonymy).

Holotype: Department of Geological Sciences, University of Greifswald, Greifswald, G.D.R., no. 4/2 (= no. OS163), ♀ RV.

Type locality: Beach at Dornbusch, Isle of Hiddensee (Baltic Sea); lat. 54° 36' N, long. 13° 7' E. Backsteinkalk erratic boulder (1B2 Type, no 1B2), middle Ordovician (equivalent of the upper Dalby Formation of Central Sweden).

Explanation of Plate 10, 26

Fig. 1, ♀ RV, ext. lat. (GPIMH 2708, 2.12 mm long excluding spines); fig. 2, ♀ RV, int. lat. (GPIMH 2709, 2.12 mm long excluding spines).

Scale A (250 µm; × 42), figs. 1, 2.

Figured specimens: Geologisch-Paläontologisches Institut und Museum (GPIMH) nos. 2708 (♀ RV: Pl. 10, 26, fig. 1), 2709 (♀ RV: Pl. 10, 26, fig. 2), 2710 (late juv. LV: Pl. 10, 28, fig. 1) and 2711 (young juv. LV: Pl. 10, 28, fig. 2). All from the Backsteinkalk (1B14 Type) erratic boulder no. Møn 2 from the beach at Liselund, Isle of Møn (Baltic Sea), Denmark; lat. 55° 0.5' N, long. 12° 32' E; coll. by the author in 1978.

Diagnosis: Species of *Bromidella* with distinct laterovellar furrow. Tecnomorphs with a flange: ventrally and posteriorly this is more or less (depending on the instar stage) dissolved into spines. Dolon from anteroventral to centroventral region. Lateral surface of domicilium and of dolon more or less spinose; spines short and blunt and of irregular shape. Females 2.12-2.40 mm long.

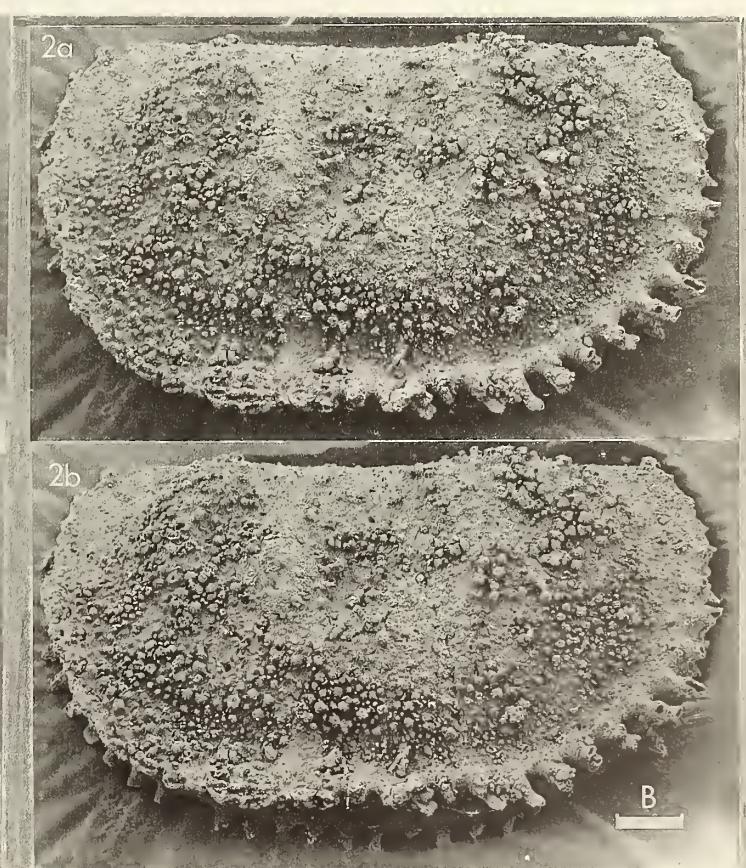
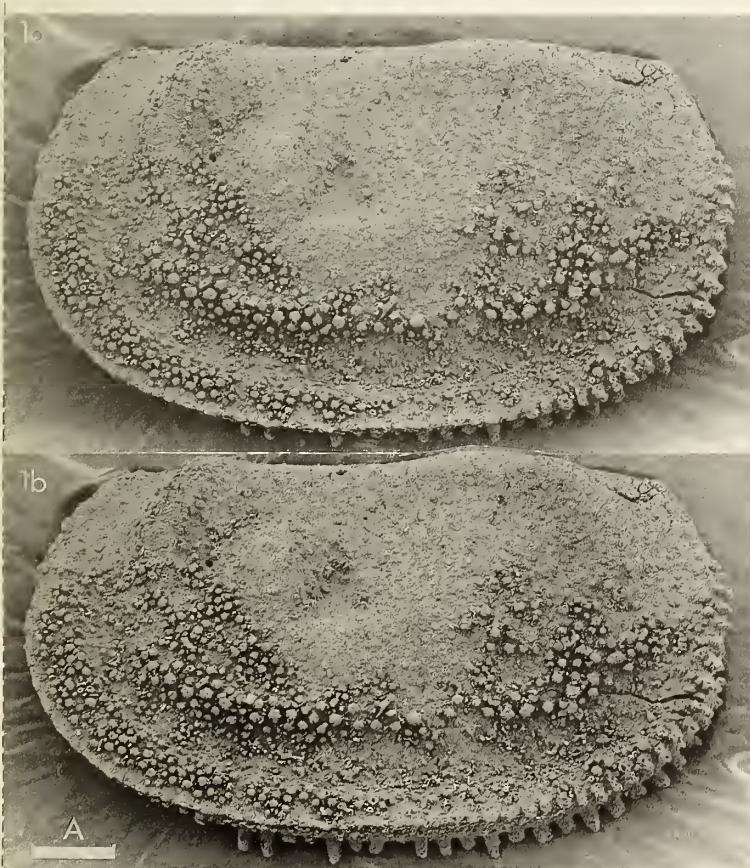
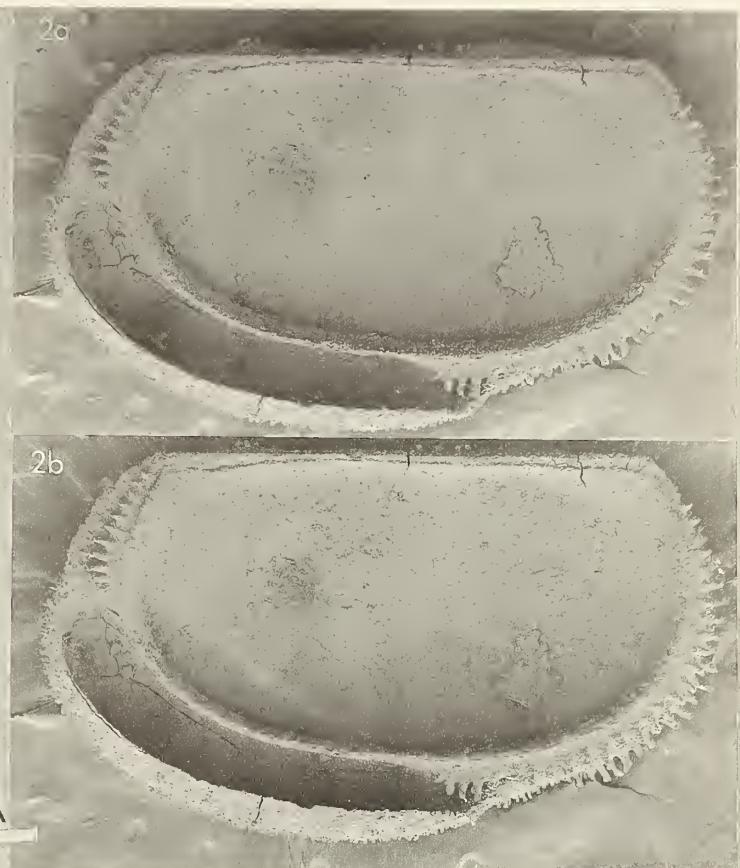
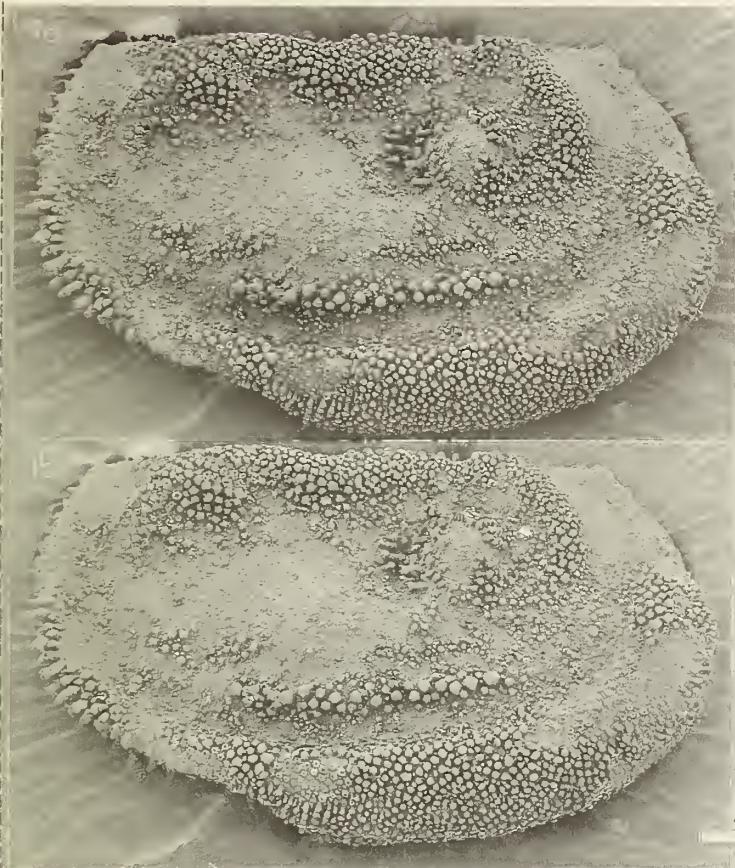
Remarks: *Bromidella sarvi* is very similar to species placed in *Uhakiella* Öpik, 1937 but in typical *Uhakiella* species the males possess special features not present in the juvenile tecnomorphs (= larvae) (cf. R. E. L. Schallreuter, *Palaeontographica*, (A), 144, pl. 19, figs. 1, 8, 1973). The females of *Bromidella reticulata* Harris, 1931 (type-species) are distinguished mainly by the lack of a laterovellar furrow and by the ornament on the dolon (short anteroventral ridge, ventral row of spines becoming larger in posterior direction), features considered significant at specific level. The morphology of the males of *B. reticulata* is unknown. By comparison with related genera (for example *Hithis* Schallreuter, 1964), it is presumed that the tecnomorphic velum consists of a row of spines or a flange and spines, similar to that in *B. sarvi*.

Distribution: Known only from Backsteinkalk erratic boulders (Types 1B2, 1B7), lower Upper Viruan, middle Ordovician; northern Germany, Denmark.

Explanation of Plate 10, 28

Fig. 1, late juv. LV, ext. lat. (GPIMH 2710, 1.835 mm long excluding spines); fig. 2, young juv. LV (GPIMH 2711, 1.025 mm long excluding spines).

Scale A (250 µm; × 51), fig. 1; scale B (100 µm; × 86), fig. 2.



ON *NANNOCY THERE PAVO* (MALCOMSON)

by John Athersuch & David J. Horne
(B.P. Research Centre, Sunbury-on-Thames & City of London Polytechnic)

Genus *NANNOCY THERE* Schäfer, 1953

1953 *Nannocythere* gen. nov. Schäfer, *Hydrobiologia* 5, 352.

Type-species: *Nannocythere remanei* Schäfer, 1953 (= *Bythocythere pavo* Malcomson, 1886)

Diagnosis: Adult carapace small (<350 µm long), elongate; anterior margin rounded with broad, compressed flange; strongly inflated. Eye spot absent. Surface strongly and evenly pitted, bearing numerous pore conuli which are most prominent posteriorly and anteriorly. Hinge gongylodont with smooth median element; posterior tooth of right valve bilobate but not split. Frontal muscle scar U-shaped; middle two of four adductor scars larger.

Small anterior and posterior vestibules. Radial pore canals few, simple. Antennula five-jointed (fourth and fifth podomeres fused). Male copulatory appendages with a prominent, coiled *ductus ejaculatorius*.

Explanation of Plate 10, 30

Fig. 1, ?-1 juv. LV, ext. lat. (syntype, 270 µm long); fig. 2, ♀ LV, ext. lat. (1982.283, 290 µm long); fig. 3, ♀ RV, ext. lat (1982.283, 290 µm long).

Scale A (100 µm; × 190), figs. 1-3.

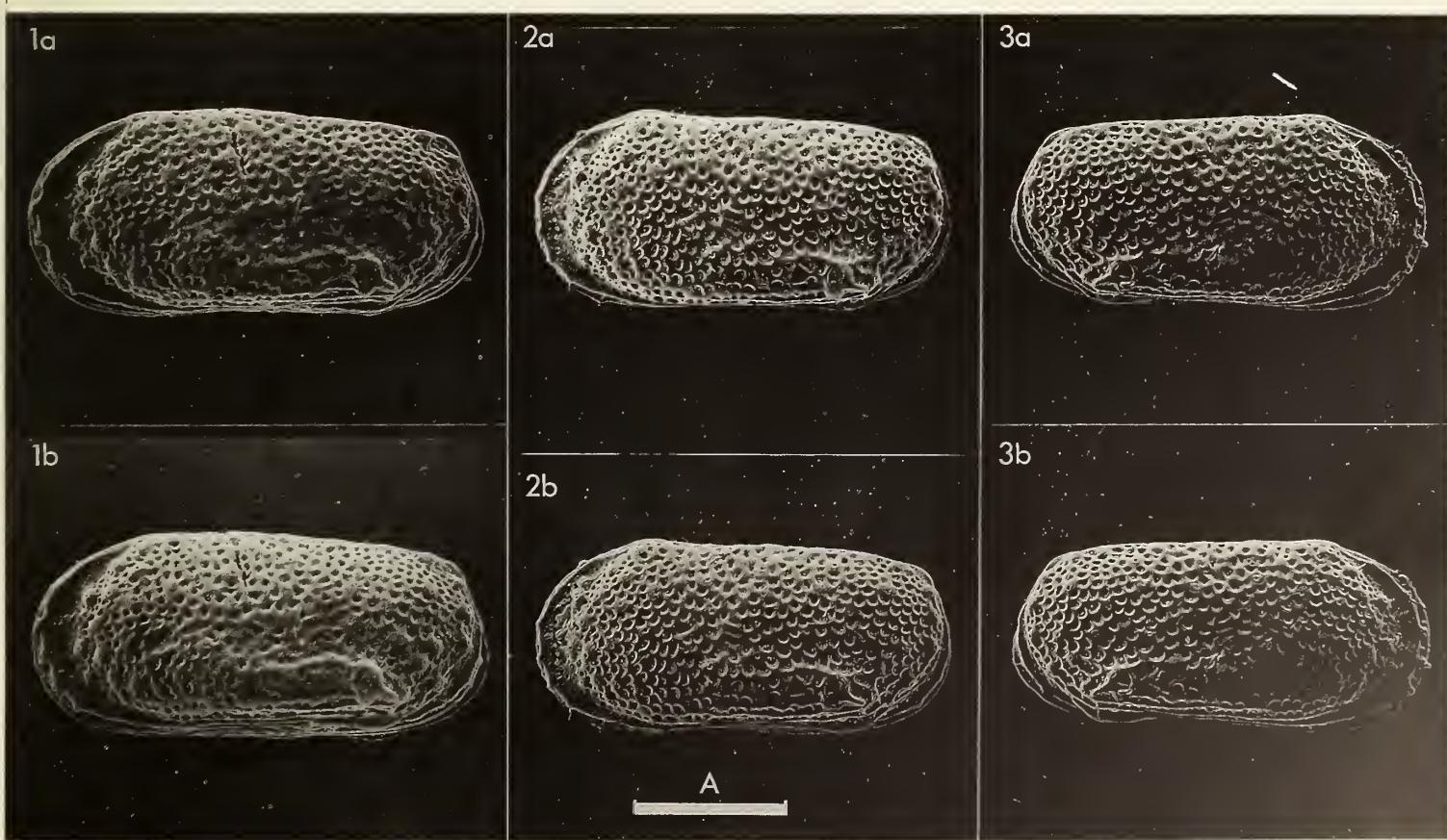
Remarks: Selected parts of Schäfer's (1953) generic diagnosis have been freely translated from the German with the assistance of S. Horne as follows: First antenna (= antennula) . . . "end part three-jointed, richly furnished with long and short setae; chelate setae absent." Second antenna (= antenna) . . . "penultimate podomere unsegmented; terminal podomere bears two chelate setae of equal length". Mandible . . . "with four-jointed palp . . . bearing respiratory plate with two setae." Maxilla (= maxillula) . . . "(palp) with three normally formed endites and a distinct end segment . . .; respiratory plate without mouthward directed setae." Legs . . . "setal formulae of basal podomeres: 221/211/210." Furca . . . "with two setae." Observations on the poorly preserved appendages of specimens available to us are consistent with this diagnosis.

Moore (1961, *Treatise on Invertebrate Paleontology*, Q, *Arthropoda* 3, *Crustacea Ostracoda*, Kansas; 353) regarded the affinities of *Nannocythere* as uncertain; Hartmann & Puri (1974, *Mitt. hamb. zool. Mus. Inst.*, 70, 26) refer this genus to the Cytheridae. In our opinion, *Nannocythere* should be placed in the Loxoconchidae since it possesses a gongylodont hinge, anterior and posterior vestibules and few, simple radial pore canals. It may be distinguished from other loxoconchid genera by a combination of small size, presence of pore conuli and absence of a fulcral point. The type-species apparently lacks a reflexed seta on the respiratory plate of the maxillula; otherwise the appendages are loxoconchid in character.

Explanation of Plate 10, 32

Fig. 1, ♂ car., ext. lt. lat. (1982.282, 330 µm long); fig. 2, ♂ LV, ext. lat. (1982.284, 300 µm long); fig. 3, ♂ RV, ext. lat. (1982.285, 300 µm long).

Scale A (100 µm; × 190), figs. 1-3.



Nannocythere pavo (Malcomson, 1886)

1886 *Bythocythere pavo* sp. nov. S. M. Malcomson, *Rep. Proc. Belf. Nat. Fld Club*, Appendix 9 (1884-5), 261, figs. 5-7.
 1953 *Nannocythere remanei* sp. nov. H. W. Schafer, *Hydrobiologia* 5, 353, figs. 1-6.

Syntype: A juvenile (-1?) left valve; Malcomson ostracod collection, slide 26, square 24; housed in the National Irish Museum, Dublin, Eire.

Type locality: Six miles off Black Head, Belfast Bay, N Ireland; approx. lat. 54° 56' N, 05° 42' W.

Diagnosis: Adults small (300-330 µm long); posterior margin truncate, dorsal and ventral margins parallel. Weak alar expansions present ventrolaterally, each terminating abruptly posteriorly in a small ornamented node. Seven anterior and four posterior radial pore canals, each opening at a marginal pore conulus.

Figured specimens: National Museum of Ireland specimen (syntype, -1 juvenile LV: Pl. 10, 30, fig. 1). Brit. Mus. (Nat. Hist.) nos. 1982.282 (♂car.: Pl. 10, 32, fig. 1), 1982.283 (♀car. + appendages; LV: Pl 10, 30, fig. 2; RV: Pl. 10, 30, fig. 3; Pl. 10, 36, fig. 2; Text-fig. 1; appendages: Text-figs. 3a-e), 1982.284 (♂LV: Pl. 10, 32, fig. 2; Pl. 10, 34, fig. 3; Pl. 10, 36, figs. 3, 5, 6; Text-fig. 2), 1982.285 (♂RV; Pl. 10, 32, fig. 3; Pl. 10, 34, fig. 2; Pl. 10, 36, figs. 4, 7), 1982.286 (♂car. + appendages; car.: Pl. 10, 34, fig. 1; Pl. 10, 36, fig. 8; appendages: Text-figs. 3f-h), 1982.287 (♂RV: Pl. 10, 36, fig. 1).

The syntype, from 6 miles (= 10 km) ESE of Black Head, Eire, has been returned to its original slide in the Malcomson ostracod collection in the National Museum of Ireland, Dublin. B.M. (N.H.) no. 1982.282 was taken from a slide in the Norman collection (1911.11.8.M3819) marked "Bythocythere recta Brady junior = *B. pavo* Malcomson. Between the Cumbrae Isles, 15-20 fathoms, July 1885". Nos. 1982.283-287 are all from surface sediments at depths of 75-100 m in the Western Approaches of the English Channel. These and other specimens (not figured herein) were kindly provided by S. Sturrock.

Explanation of Plate 10, 34

Fig. 1, ♂car., dors. (1982.286, 310 µm long); fig. 2, ♂RV, int. lat. (1982.285, 300 µm long); fig. 3, ♂LV, int. lat. (1982.284, 300 µm long).

Scale A (100 µm; × 190), figs. 1-3.

Remarks: The only remaining specimen of *N. pavo* in the Malcomson collection is undoubtedly a juvenile (?-1) instar as it is very small (280 µm long), thin-shelled with poorly developed hinge and marginal areas. It compares well with larger specimens in showing incipient or partial development of the pore conuli, ornament and alae which are characteristic of adults of this species.

Two other juvenile specimens from "off Black Head, Belfast Bay" are housed in a slide marked "Bythocythere? pavo n. sp. type = *Cytheropteron rectum* junior" in the Brady collection, Hancock Museum, Newcastle-upon-Tyne. They may possibly also be syntypes, since they are likely to have been sent to Brady by Malcomson.

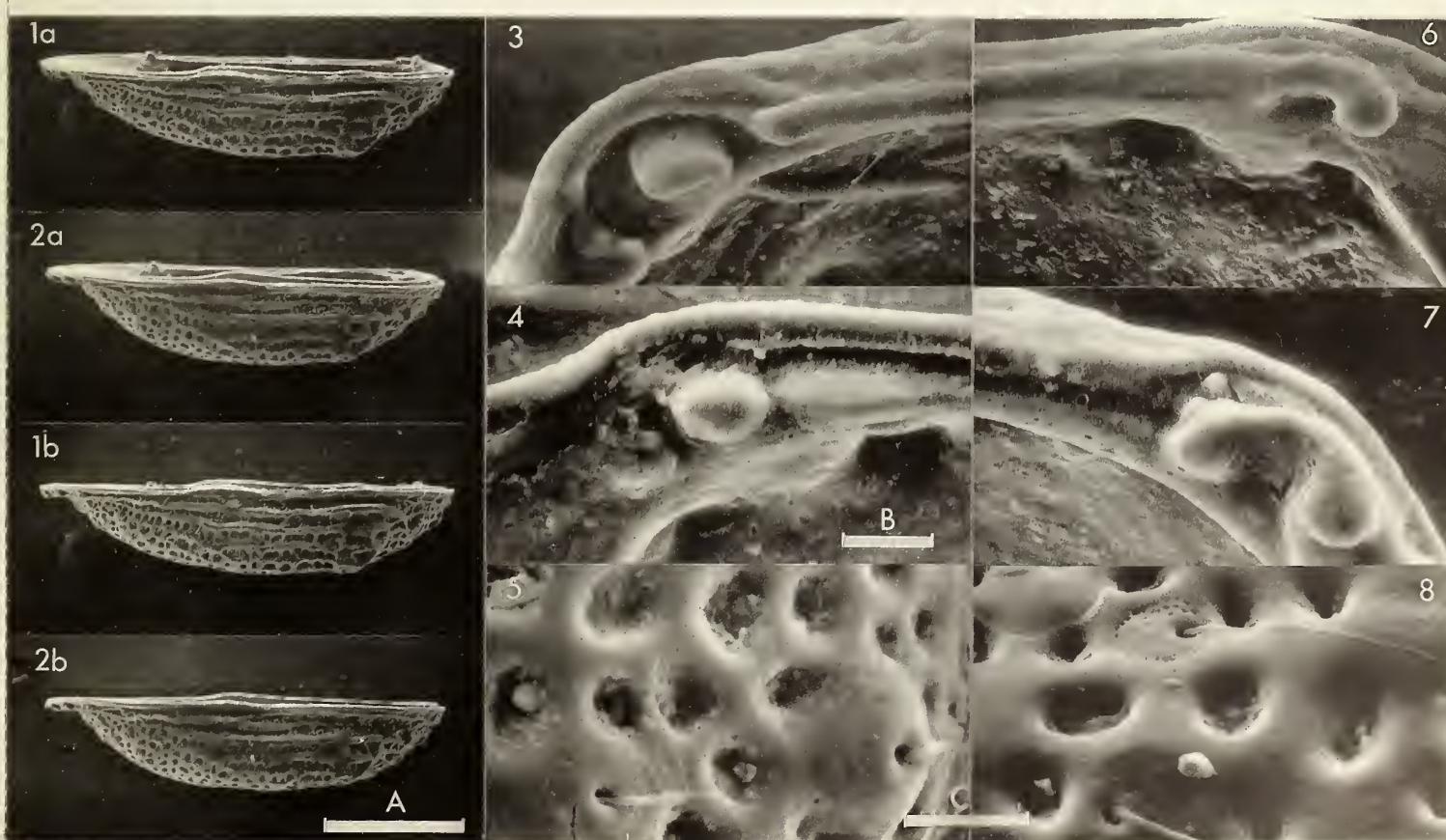
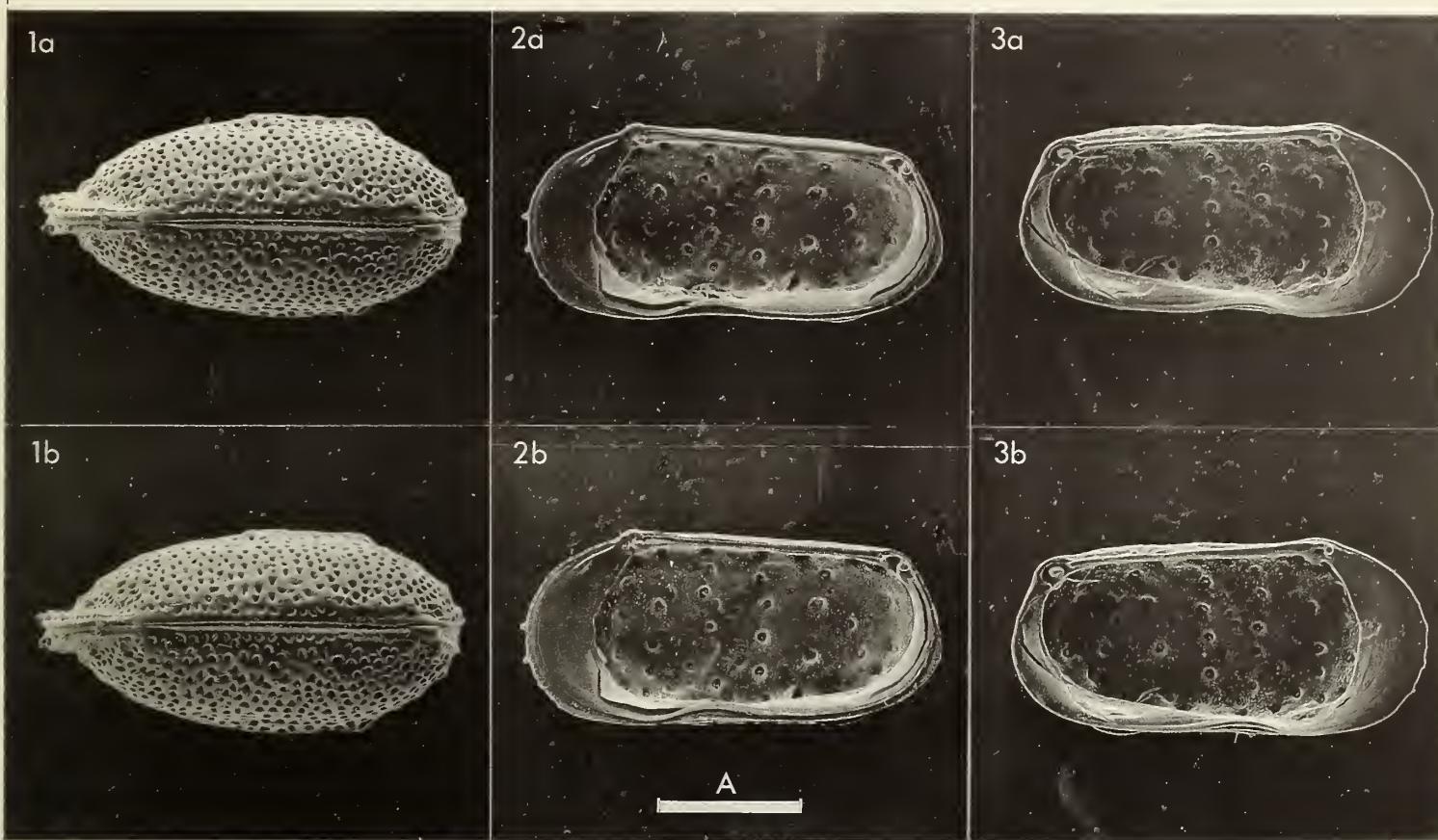
Brady & Norman, 1889 (*Scient. Trans. R. Dubl. Soc.*, ser. 2, 4, 223) considered Malcomson's material of *N. pavo* to be a juvenile instar of *Cytheropteron rectum* Brady, 1868. From our examination of the type material of both *C. rectum* (B.M. (N.H.) slide no 1911.11.8.M3820) and *N. pavo* (herein), it is clear that the two species are distinct and are probably not even congeneric. The two species have similar surface ornament and hinges but *N. pavo* (300-330 µm) is considerably smaller than *C. rectum* (490 µm). The latter bears a distinct vertical median sulcus, a fulcral notch and prominent alae but lacks an anterior marginal flange. No appendages of *C. rectum* were available for comparison.

Cytheromorpha nana Bonaduce, Ciampo & Masoli, 1975 (*Pubbl. Staz. zool. Napoli*, 40, 114, pl. 70, figs. 9-11) from the Recent of the Adriatic bears a superficial resemblance to *N. pavo* and may belong to *Nannocythere*. It differs from *N. pavo* in its lack of alae and in bearing a faint reticulum. Another Recent species, *Loxoconcha* sp., illustrated by Reys, 1961 (*Recl. Trav. Stn mar. Endoume*, 22, 82, pl. 9, figs. 1a-e) from near Marseilles is in our opinion congeneric with *N. pavo*, but differences in the shapes of the male copulatory appendages serve to separate the two species.

Explanation of Plate 10, 36

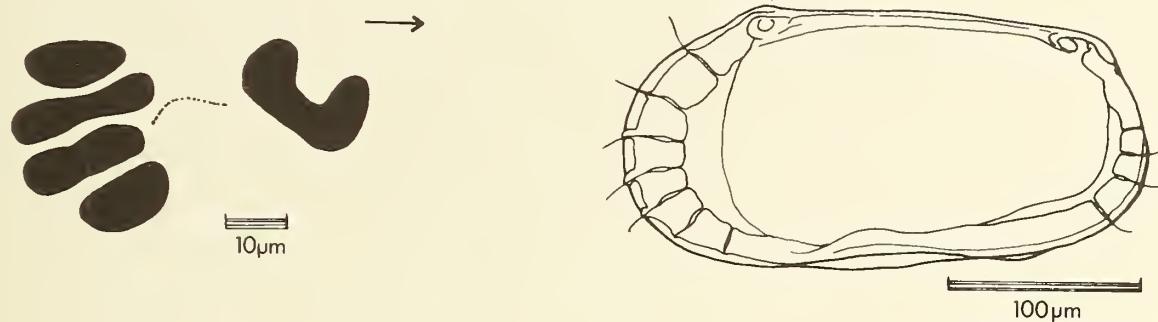
Fig. 1, ♂RV, vent. (1982.287, 300 µm long); fig. 2, ♀RV, vent. (1982.283, 290 µm long); fig. 3, ♂LV, post. hinge element (1982.284); fig. 4, ♂RV, ant. hinge element (1982.285); fig. 5, ♂LV, dors. ornament (1982.284); fig. 6, ♂LV, ant. hinge element (1982.284); fig. 7, ♂RV, post. hinge element (1982.285); fig. 8, ♂car., post. dors. ornament (1982.286).

Scale A (100 µm; × 190), figs. 1, 2; scale B (10 µm; × 1200), figs. 3, 4, 6, 7; scale C (10 µm; × 1700), figs. 5, 8.



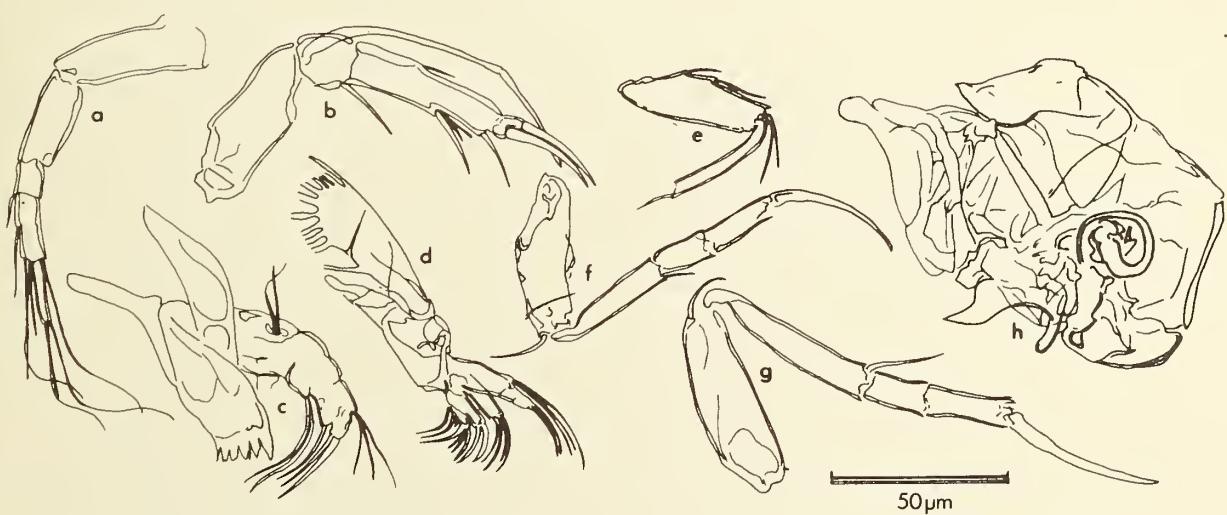
Text-fig. 1. *Nannocythere pavo*, ♀ RV seen in transmitted light. (1982.283).

Text-fig. 2. *Nannocythere pavo*, ♂ LV, muscle scar pattern. (1982.284).



Distribution: We have encountered this species in material from the English Channel where it was living in association with coarse sands and gravels. It is also known from several other marine sublittoral localities: N Ireland (Malcomson), Eire (Brady collection), Helgoland (Schäfer) and Cumbrae, Scotland (B.M. (N.H.) collection).

Text-fig. 3. *Nannocythere pavo*, appendages. a- antennula, b- antenna, c- mandible, d- maxillula, e-g- legs 1-3, h- copulatory appendage. a-e: ♀ (1982.283); f-h: ♂ (1982.286).





ON ROBERTSONITES TUBERCULATUS (SARS)

by David J. Horne
(City of London Polytechnic, England)

Genus ROBERTSONITES Swain, 1963

Type-species: *Robertsonites gubikensis* Swain, 1963 (= *Cythereis tuberculata* Sars, 1866)

Diagnosis: Carapace subquadrate in lateral view, tapering posteriorly. Anterior margin broadly rounded. Sexual dimorphism conspicuous, male more elongate and less inflated than female. Ornament reticulate with variously disposed nodes or swellings. Anterior and postero-ventral margins may bear small spines or denticles. Hinge holamphidont with elongate, curved anterior and posterior teeth in right valve, and a crenulate median element. Four adductor muscle scars in a vertical row, the top one separated from the other three; frontal scar U- or J-shaped. Radial pore-canals swollen at mid-length, 20-30 anteriorly and 10-15 posteriorly. Small anterior vestibule.

Antennula six-jointed. Spinneret seta (exopodite) of antenna long in male, short in female. Respiratory plate (exopodite) of mandible palp bearing five setae. First and second legs of similar size, third leg considerably longer with a long, slender terminal claw. Setal formulae of basal podomeres of legs: 221, 211, 211. Posterior setae of basal podomeres of first and second legs carrot-shaped, pilose. Male copulatory appendage relatively large, complex, with a prominent *ductus ejaculatorius* and variously-shaped distal processes.

Remarks: The diagnosis of the appendages is based on *R. tuberculatus*; apart from the type-species, only one other species of *Robertsonites* is known, namely the Recent Antarctic species *R. antarcticus* Neale,

Explanation of Plate 10, 40

Fig. 1, ♂ LV, ext. lat. (1982.193, 1080 µm long); fig. 2, ♀ LV, ext. lat. (1982.194, 1020 µm long); fig. 3, juv. (-2) LV, ext. lat. (1982.195, 680 µm long).

Scale A (250 µm; × 60), figs. 1-3.

Remarks (cont.): 1967, the appendages of which have not been described. The appendages of *Robertsonites* are closely similar to those of *Trachyleberis* Brady, 1898 (see Harding, J. P. & Sylvester-Bradley, P. C., *Bull. Brit. Mus. Nat. Hist. (Zool.)*, 2, (1), 1-16, 1953). *Robertsonites*, however, lacks the spinose surface ornament of *Trachyleberis*, and there are differences in the shape of the hinge teeth.

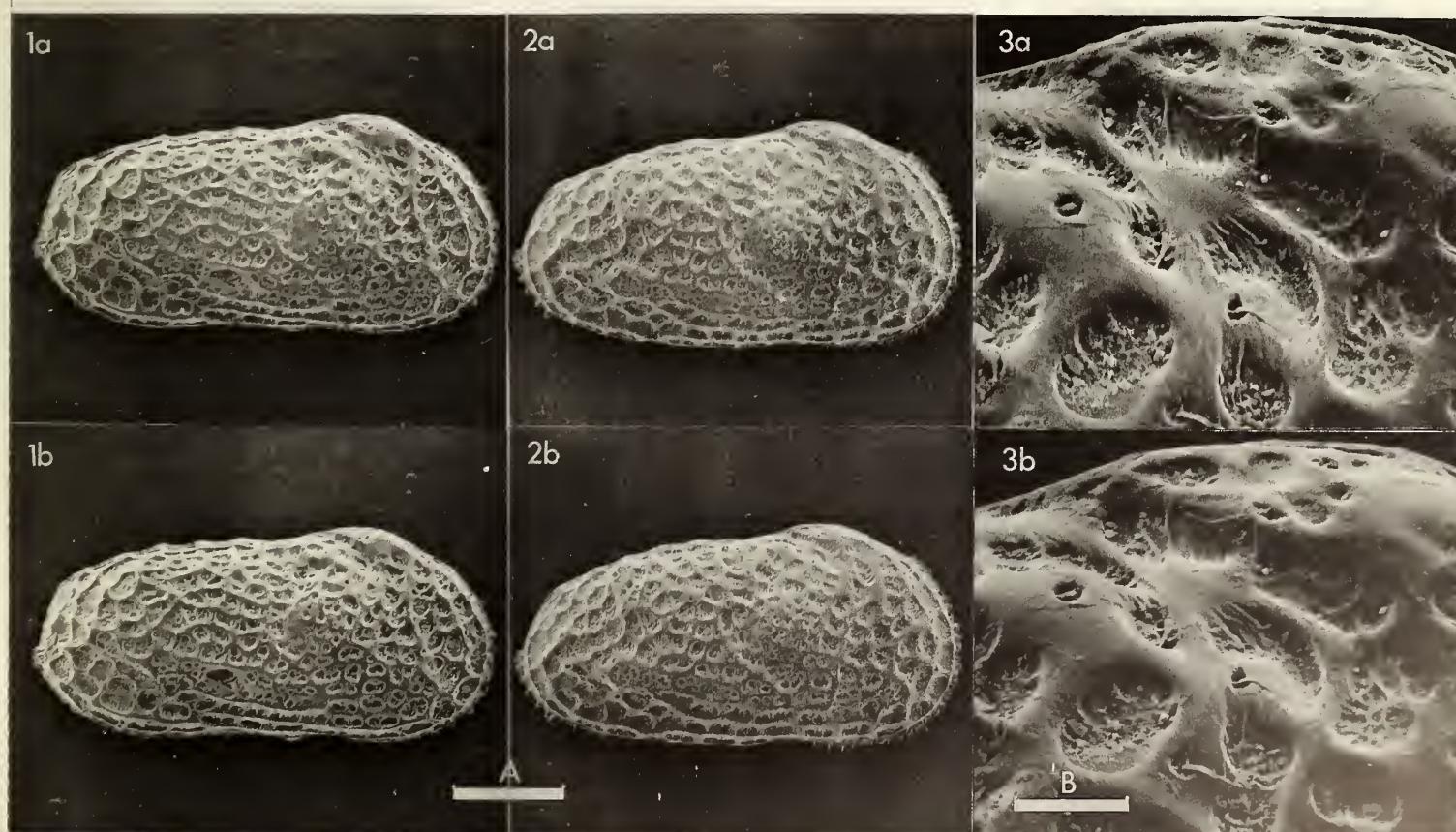
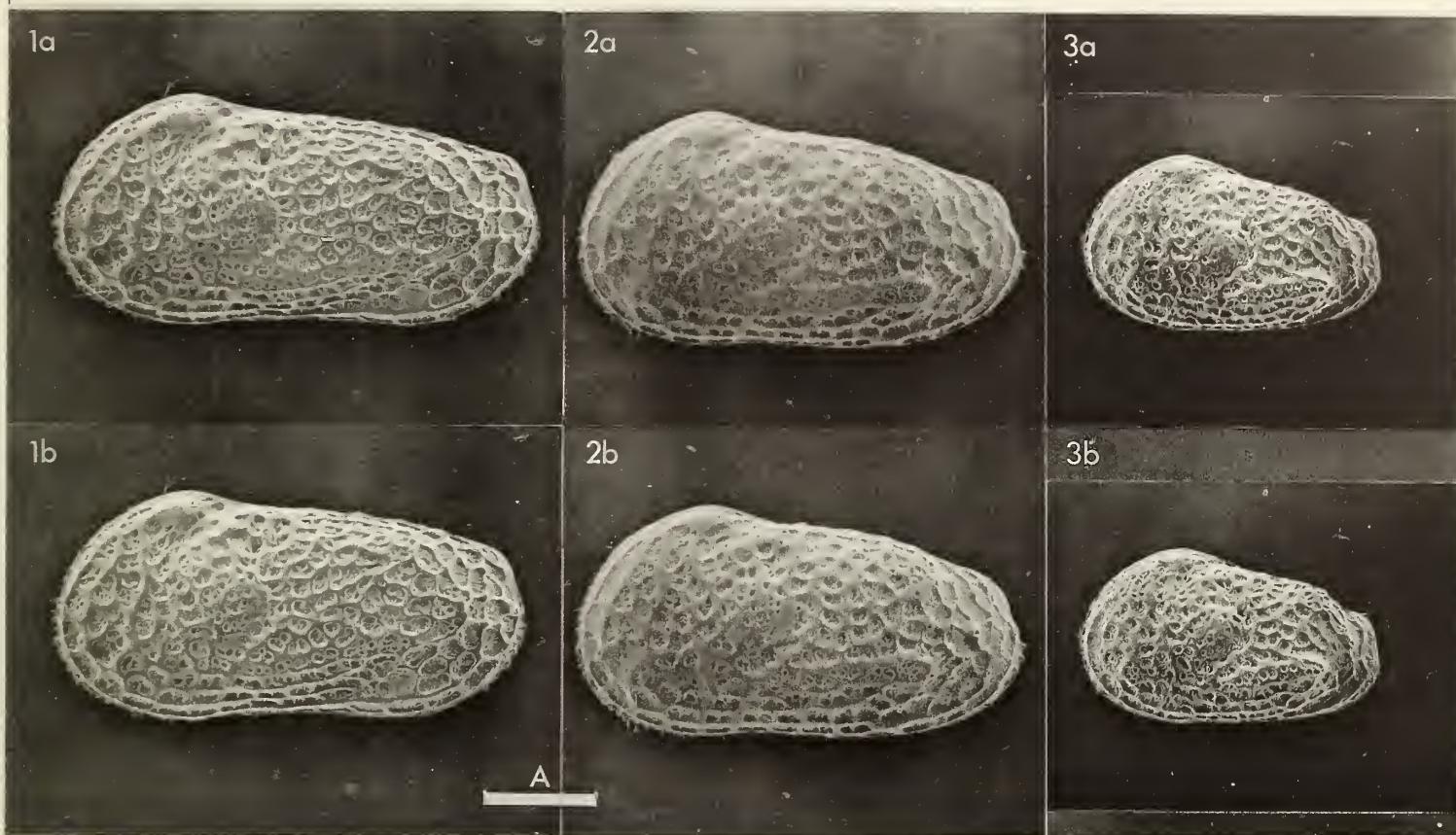
Robertsonites tuberculatus (Sars, 1866)

- 1866 *Cythereis tuberculata* sp. nov. G. O. Sars, *Forh. Vidensk Selsk. Krist.*, (vol. for 1865), 37.
- 1866 *Cythere clathrata* Reuss; G. S. Brady, *Trans. zool. Soc. Lond.*, 5, (pars), 376-377, pl. 59, figs. 12a-c (var. *lyrata*), 13a-c (var. *latimarginata*) only, (non pl. 59, figs. 9a-c, 10a-c (var. *nuda*), 11a-d). [non *Cypridina clathrata* Reuss, 1849, non *Cythere lyrata* Reuss, 1856, non *Cythere latimarginata* Speyer, 1863].
- 1866 *Cythere mutabilis* Brady (MS); G. S. Brady, *Trans. zool. Soc. Lond.*, 5, (pars), 377, pl. 59, figs. 14c-h only, (non pl. 59, figs. 14a-b).
- 1868 *Cythere tuberculata* (Sars); G. S. Brady, *Trans. Linn. Soc. Lond.*, 26, 406-407, pl. 30, figs. 25-39.
- 1874 *Cythere tuberculata* (Sars); G. S. Brady, H. W. Crosskey & D. Robertson, *A monograph of the Post-Tertiary Entomostraca of Scotland (including species from England and Ireland)*, Palaeontographical Soc. Lond., 164-165, pl. 5, figs. 7-12.
- 1874 *Cythere logani* Brady & Crosskey; G. S. Brady, H. W. Crosskey & D. Robertson, *Palaeont. Soc. Lond.*, 165, pl. 15, figs. 17-18, (non *C. logani* Brady & Crosskey, 1871).
- 1925 *Cythereis tuberculata* Sars; G. O. Sars, *An account of the Crustacea of Norway*, 9, Ostracoda, Bergen Museum, parts 11-12, 192, pl. 88.
- 1963 *Robertsonites gubikensis* sp. nov. F. M. Swain, *J. Paleont.*, 37, (4), 821-822, pl. 98, figs. 8a-b, pl. 99, fig. 12; Text-fig. 9b.
- 1963 *Robertsonites tuberculatina* sp. nov. F. M. Swain, *J. Paleont.*, 37, (4), 822-823, pl. 98, fig. 10, pl. 99, fig. 1; Text-fig. 9c.
- ?1963 *Robertsonites logani* (Brady & Crosskey); F. M. Swain, *J. Paleont.*, 37, (4) 823, pl. 97, fig. 13, (non *Cythere logani* Brady & Crosskey, 1871).
- 1967 *Robertsonites tuberculata* [sic] (Sars); J. E. Hazel, *U.S. Geol. Survey Prof. Paper* 564, 35, pl. 6, figs. 1-3.
- 1975 *Robertsonites tuberculata* [sic] (Sars); J. W. Neale & H. V. Howe, *Bull. Amer. Paleont.*, 65, (282), pl. 1, fig. 1, pl. 2, figs. 1-3.
- 1981 *Robertsonites tuberculatus* (Sars); T. M. Cronin, *Micropaleontology*, 27, (4), 400-402, pl. 8, fig. 5.

Explanation of Plate 10, 42

Fig. 1, ♂ RV, ext. lat. (1982.193, 1070 µm long); figs. 2, 3, ♀ RV (1982.194, 1020 µm long), fig. 2, ext. lat., fig. 3, detail of antero-dorsal region.

Scale A (250 µm; × 60), figs. 1, 2; scale B (50 µm; × 320), fig. 3.



Type-specimens: The specimens of *R. tuberculatus* in the Sars collection (Zoological Museum, Oslo, no. **F12033**, Mp. **528**) are in poor condition. However, the descriptions and illustrations of Sars (1866, 1925) adequately define this species.

Coasts of Norway; recorded by Sars (1866) from Christiania (= Oslo) Fjord, the Lofoten Islands and Oxfjord (Finmark), to depths of up to forty fathoms (= 73 m).

Figured specimens: Brit. Mus. (Nat. Hist.) nos. **1982.193** (♂ LV: pl. **10**, 40, fig. 1; RV: pl. **10**, 42, fig. 1; appendages: text-figs. 2a-d, 3a, 3c), **1982.194** (♀ LV: pl. **10**, 40, fig. 2; RV: pl. **10**, 42, figs. 2-3, pl. **10**, 46, figs. 1-4), **1982.195** (juv.-2; LV: pl. **10**, 40, fig. 3; RV: pl. **10**, 44, fig. 3), **1982.196** (♂ car.: pl. **10**, 44, fig. 1), **1982.197** (♀ car.: pl. **10**, 44, fig. 2), **1982.198** (♀ RV: pl. **10**, 48, fig. 1), **1982.199** (♂ LV: pl. **10**, 48, figs. 2-3), **1982.200** (♂ appendages: text-figs. 1a, 3b), **1982.201** (♂ LV; text-fig. 1b), **IO 6739** (♀ LV: pl. **10**, 50, fig. 3). **1982.247** (♂ RV: pl. **10**, 50, fig. 1), **1982.248** (♀ RV: pl. **10**, 50, fig. 2). **1982.193-200** all from the A. M. Norman collection; **1982.193, 195, 196, 197** from Larvik (Larvik), Norway (approx. lat. 59° 05' N, long. 10° 00' E), ex slide no. 1911.11.8 M3277; **1982.194, 200** from Hollingspollen, Drobak, Norway (approx. lat. 59° 40' N, long. 10° 40' E), ex slide no 1900-3-6-249; **1982.198, 199** from Holsteinbourg Harbour, W Greenland (approx. lat. 66° 55' N, long. 53° 35' W), ex slide no. 1911.11.8. M3281. **1982.201** collected alive off W Mersea, Blackwater Estuary, SE England (approx. lat. 51° 45' N, long. 00° 55' E) in September 1974, and **IO 6739** from the Pleistocene (Hoxnian) Bridlington Crag of NE England, both provided by J. E. Robinson. **1982.247, 248** from Recent sediments in the Gulf of Alaska provided by E. Brouwers; **1982.247** from 101 m depth, lat 60° 01.0' N, long. 143° 09.3' W (EGAL-75-KC 338) and **1982.248** from 115 m depth, lat. 59° 47.4' N, long. 142° 14.4' W (EGAL-75-KC 285).

Explanation of Plate 10, 44

Fig. 1, ♂ car., ext. dors. (**1982.196**, 1080 µm long); fig. 2, ♀ car., ext. dors. (**1982.197**, 1070 µm long); fig. 3, juv. (-2) RV, ext. lat. (**1982.195**, 680 µm long).

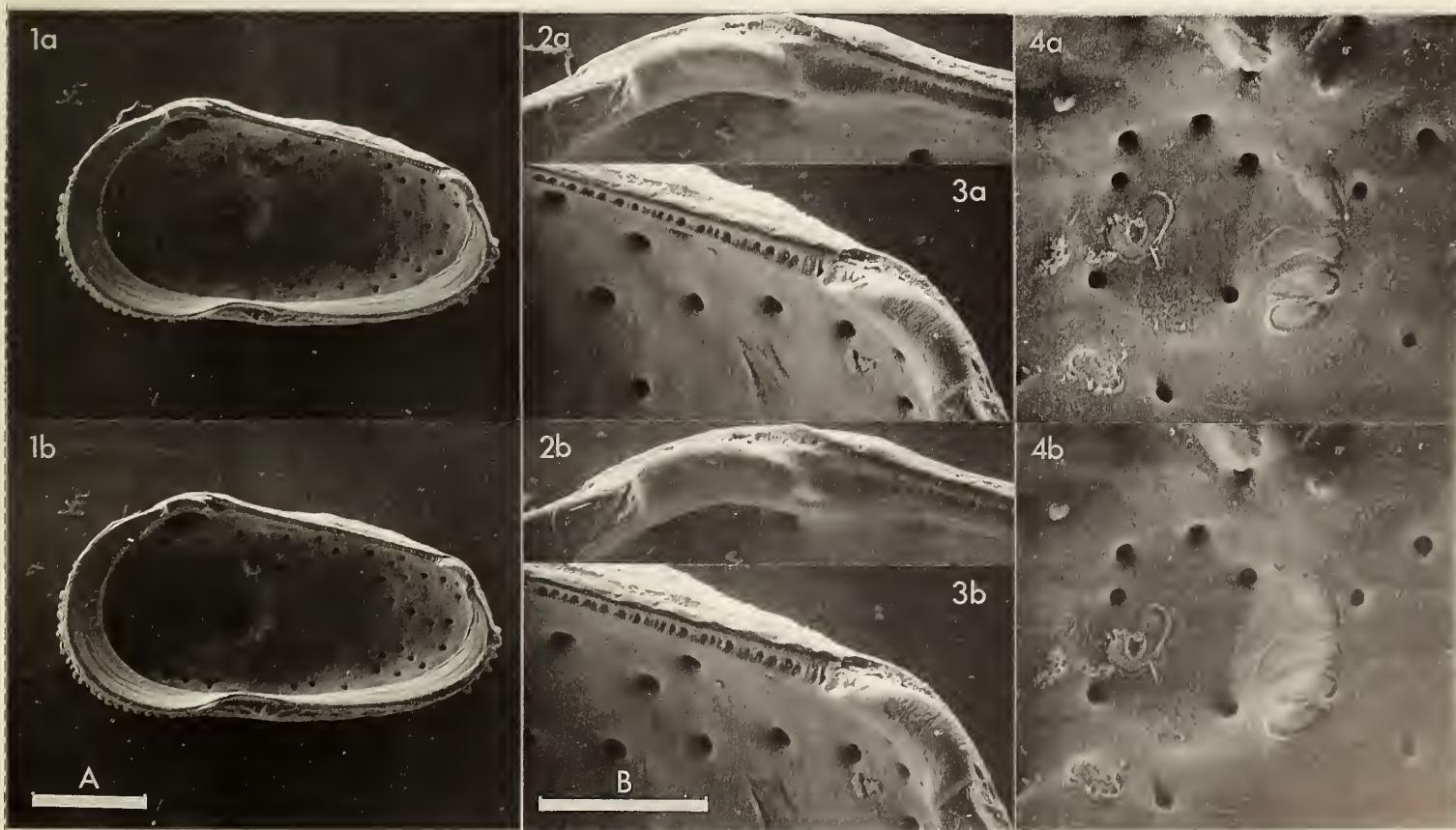
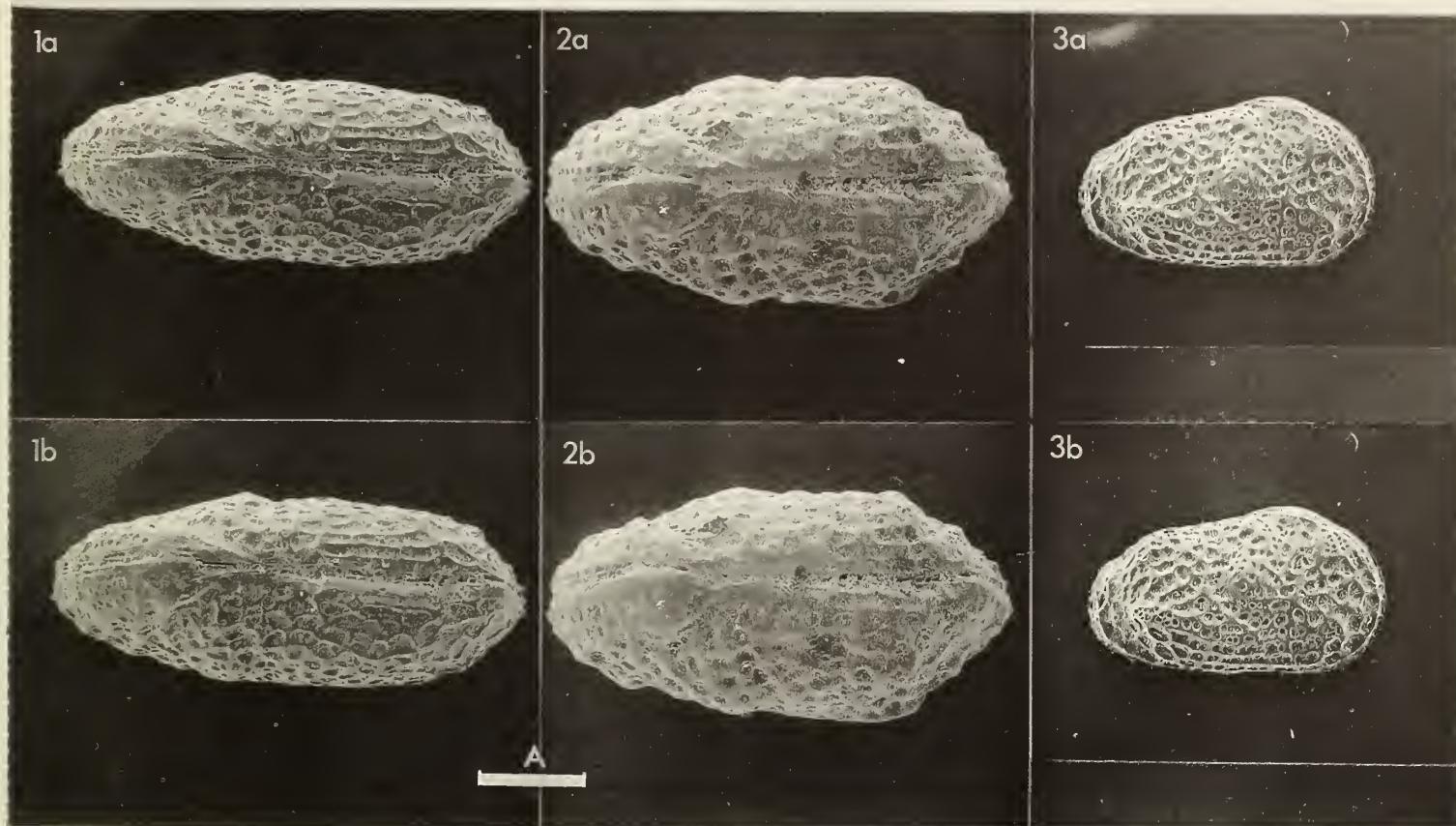
Scale A (250 µm; × 60), figs. 1-3.

Diagnosis: Valves with reticulate ornament modified by the presence of five or six nodes or tubercles; the sub-central, postero-dorsal and postero-ventral nodes are the most prominent, while weaker nodes may be seen posteriorly, antero-dorsally and antero-ventrally. Male copulatory appendage with a long, tapering distal process directed anteriorly and two smaller processes directed ventrally and posteriorly.

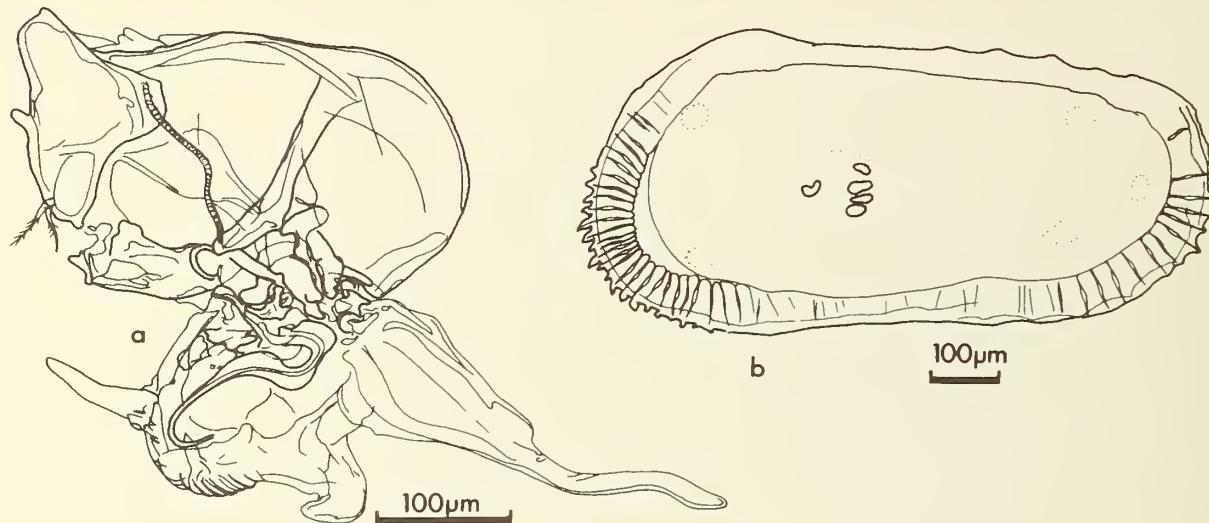
Remarks: Hazel (1967, *op. cit.*) has shown the holotypes of *R. gubikensis* Swain and *R. tuberculatina* Swain to be female and male respectively of *R. tuberculatus*. As Hazel and other authors have remarked, *R. tuberculatus* exhibits considerable variation in outline and ornament. The development of the nodes and reticulation is very variable; the nodes may be more conspicuous in juvenile specimens, while in adults they are often obscured by strong primary and secondary reticulation. Specimens from Greenland (see pl. **10**, 48, figs. 1-2) have more conspicuous secondary reticulation and are larger than those from Norway (see pl. **10**, 40, figs. 1-2, and pl. **10**, 42, figs. 1-2) but a comparison of their male copulatory appendages, which are identical, has shown them to be conspecific. Specimens from the Alaskan Shelf (see pl. **10**, 50, figs. 1-2) are less elongate and have more prominent nodes than those from Greenland and Norway. Unfortunately I have been unable to obtain male copulatory appendages from Alaskan material.

Explanation of Plate 10, 46

Figs. 1-4. ♀ RV (**1982.194**, 1020 µm long): fig. 1, int. lat., figs. 2, 3, anterior and posterior hinge elements, fig. 4, int. musc. sc. Scale A (250 µm; × 60), fig. 1; scale B (100 µm; × 210), figs. 2-4.



Text-fig. 1. a: ♂ copulatory appendage (1982.200); b: ♂ LV (1982.201) drawn in transmitted light; dotted lines show approximate positions of nodes.



Explanation of Plate 10, 48

Fig. 1, ♀ RV, ext. lat. (1982.198, 1100 μm long); figs. 2, 3, ♂ LV (1982.199, 1210 μm long), fig. 2, ext. lat., fig. 3, detail of antero-central region.

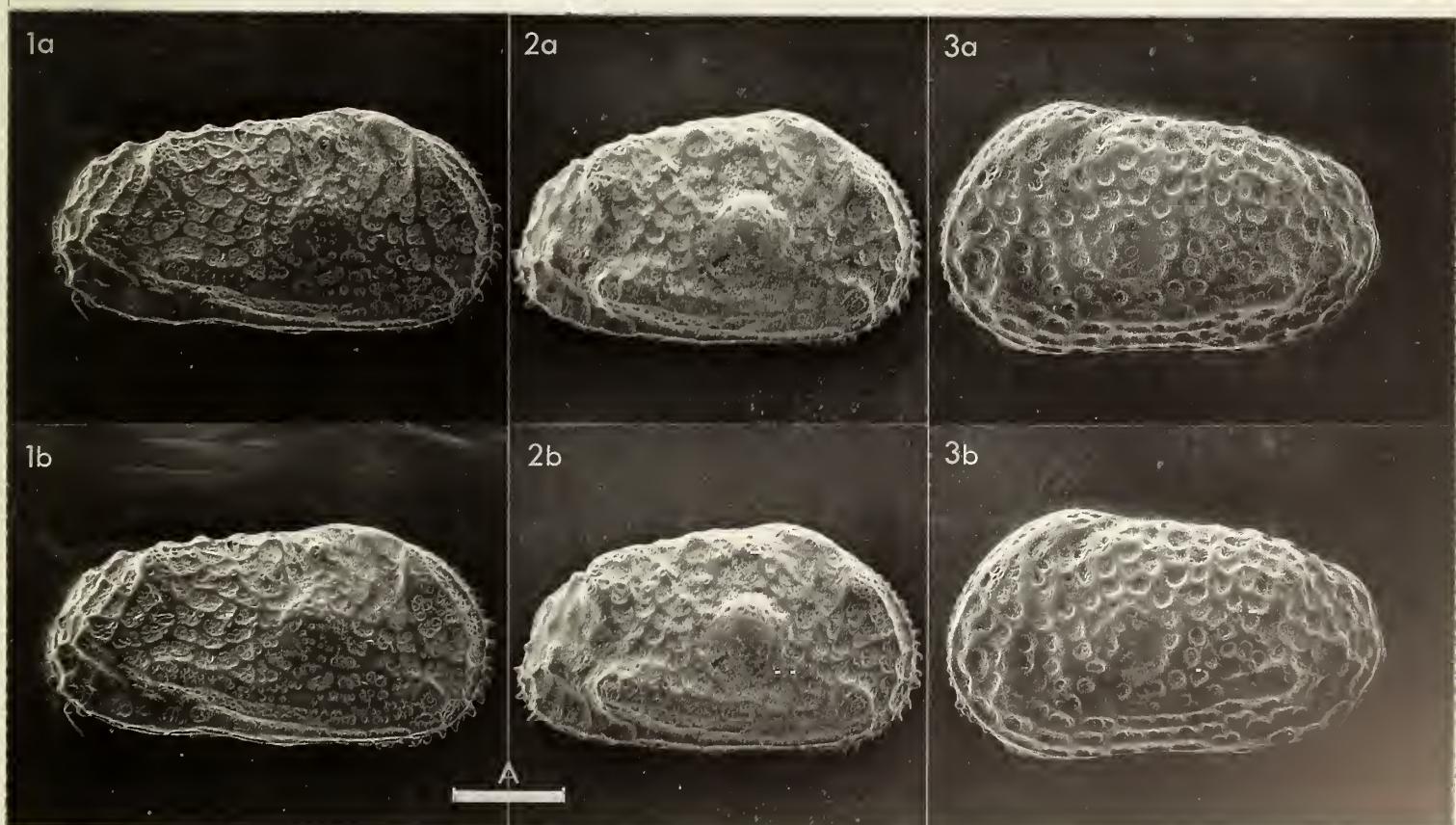
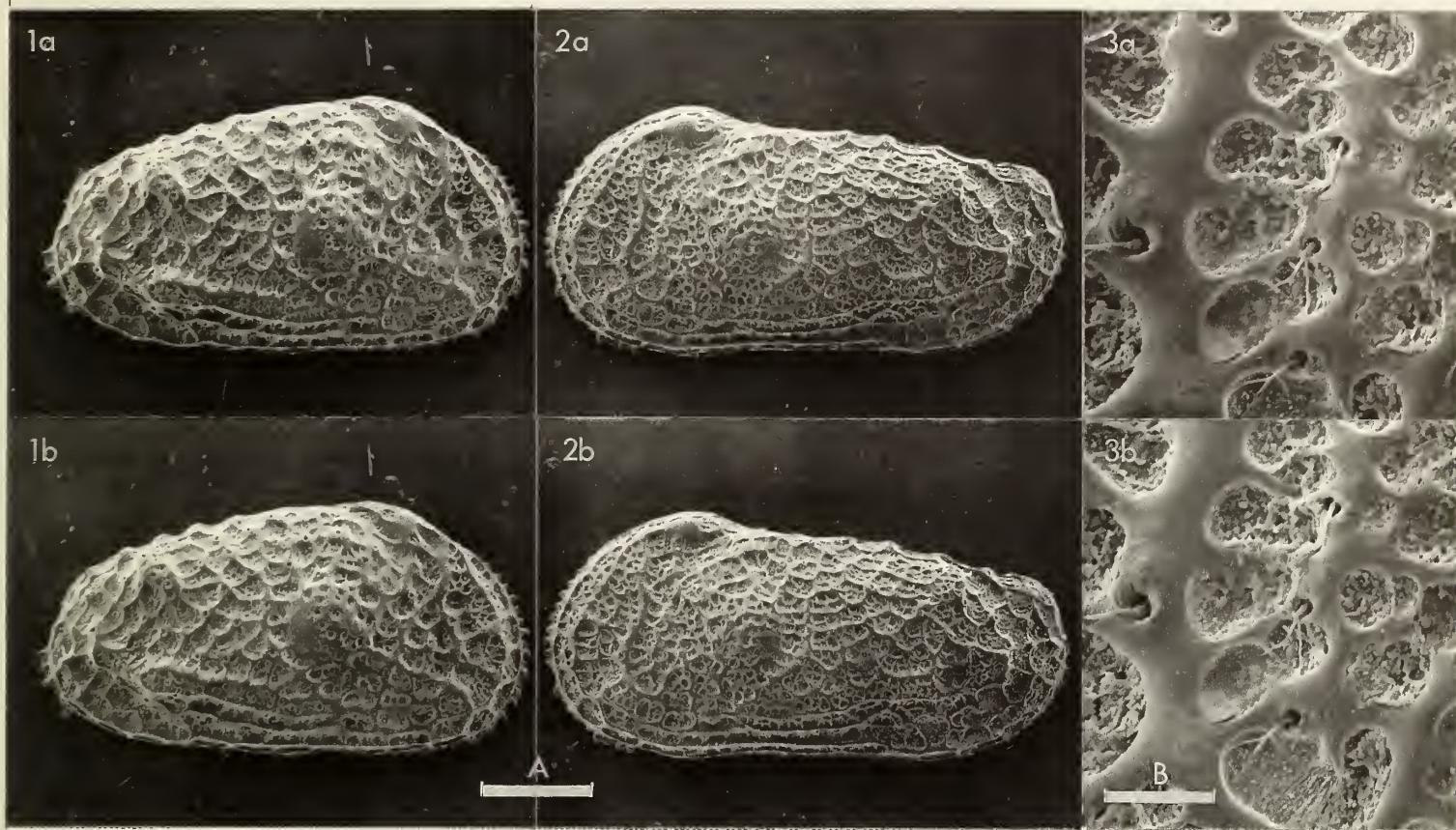
Scale A (250 μm ; $\times 60$), figs. 1-2; scale B (50 μm ; $\times 320$), fig. 3.

Distribution: Recent: most abundant in Arctic seas (Neale & Howe, op. cit.); N Atlantic, coasts of NW Europe from N Norway to southern N Sea, Greenland and NE America (Hazel, op. cit., and herein); Gulf of Alaska (herein); sublittoral. Pleistocene: British Isles (Brady, Crosskey & Robertson, op. cit., and herein), Norway (Sars, op. cit.), NE America (Cronin, op. cit.), and Alaska (Swain, op. cit.).

Explanation of Plate 10, 50

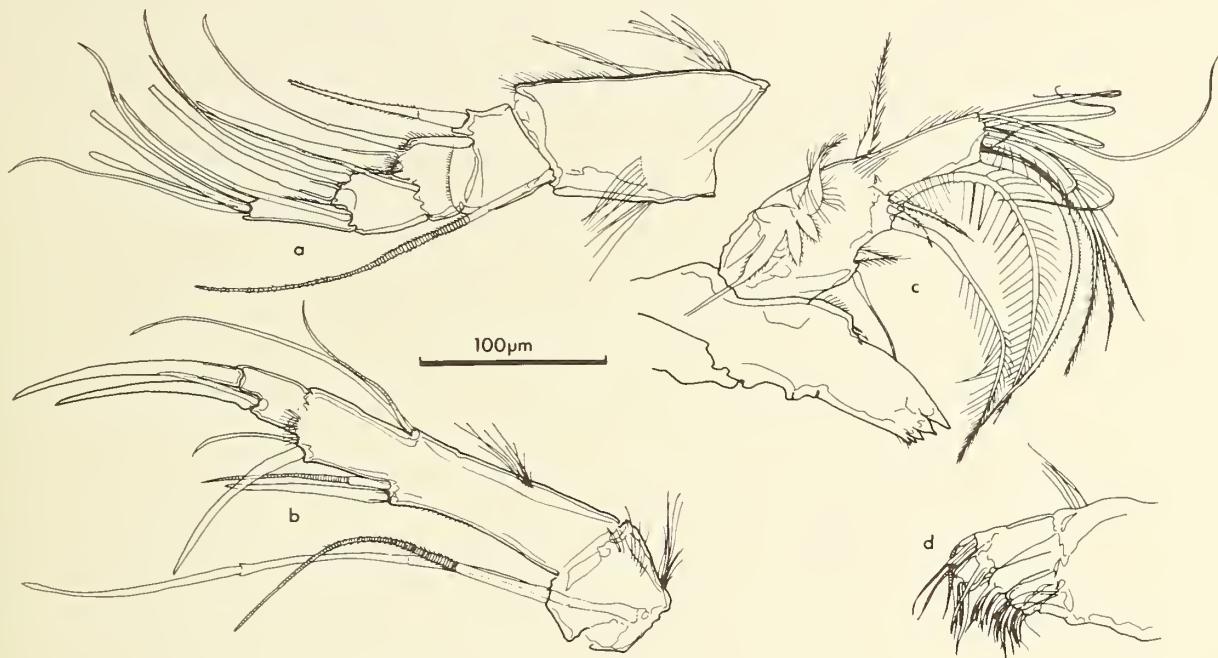
Fig. 1, ♂ RV, ext. lat. (1982.247, 1020 μm long); fig. 2, ♀ RV, ext. lat. (1982.248, 940 μm long); fig. 3, ♀ LV, ext. lat. (IO 6739, 1010 μm long).

Scale A (250 μm ; $\times 60$), figs. 1-3.

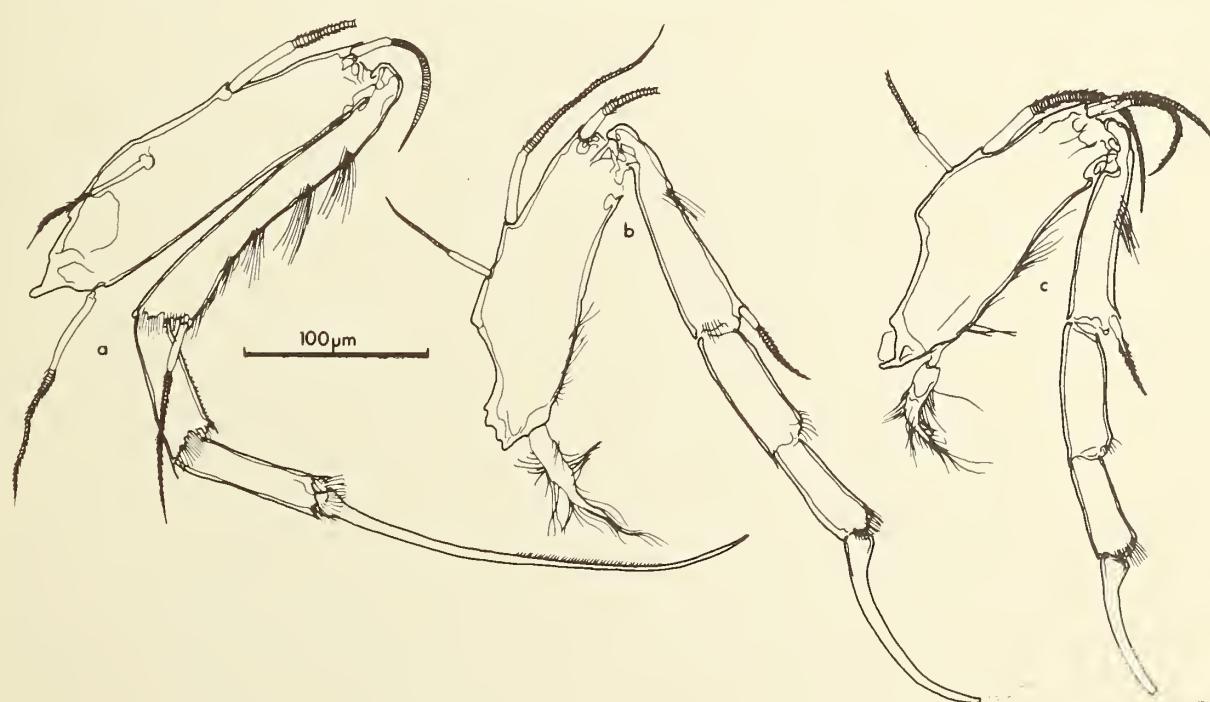




Text-fig. 2. ♂ appendages (1982.193), a: antennula; b: antenna; c: mandible; d: maxillula.



Text-fig. 3. ♂ appendages; a: third leg (1982.193); b: second leg (1982.200); c: first leg (1982.193).



ON BAFFINICYTHERE HOWEI HAZEL

by David J. Horne and John E. Whittaker
(City of London Polytechnic & British Museum (Natural History), London)

Genus BAFFINICYTHERE Hazel, 1967

Type-species: *Cythere costata* Brady, 1866 (non M'Coy, 1844) = *Baffinicythere howei* Hazel, 1967

1967 *Baffinicythere* gen. nov., J. E. Hazel, U.S. Geol. Survey Prof. Paper 564, 16

Diagnosis: Carapace elongate subrectangular (male) to subtrapezoidal or auriform (female) in lateral view. Ornament strongly reticulate, with prominent ridges forming triangle in postero-lateral region. Marginal pore canals numerous, swollen at mid-length. Small anterior and posterior vestibules. Hinge robust, holamphidont. Ocular sinus conspicuous. Adductor muscle scars: a single elongate dorsal scar, two rounded dorso-median scars, an elongate ventro-median scar showing incipient subdivision, and an elongate ventral scar. Three rounded frontal scars. Antennula with five articulated podomeres. Male copulatory appendage with large basal capsule, small distal process and inconspicuous *ductus ejaculatorius*.

Remarks: The appendages of *Baffinicythere* are typically hemicytherid. Hazel (1967, op. cit.) established this genus for two species, the genotype and *Cythereis emarginata* Sars, 1866. From our comparison of both species we would prefer to place *C. emarginata* in *Hemicythere* Sars, 1925, since it has only two frontal muscle scars and a male copulatory appendage with a conspicuous *ductus ejaculatorius*. In our view, *Baffinicythere* is monospecific, although we have been informed of several as yet undescribed Pleistocene to Recent species of this genus found in the northern Pacific Ocean (Dr J. E. Hazel, pers. comm.).

Explanation of Plate 10, 54

Fig. 1, ♂ LV, ext. lat. (1.22.08, paralectotype; 1,200 µm long); fig. 2, ♀ LV, ext. lat. (1.22.09, lectotype; 1,140 µm long); fig. 3, ♀ RV, ext. lat. (1983.1; 1,200 µm long).

Scale A (250 µm; × 50), figs. 1-3.

Remarks (cont.): *Baffinicythere* differs from related *Elofsonella* Pokorny, 1955 (type-species *Cythere concinna* Jones, 1857) in having the ventro-median adductor muscle scar undivided, and in the nature of the surface ornament.

Baffinicythere howei Hazel, 1967

1866 *Cythere costata* sp. nov. G. S. Brady, Trans. zool. Soc. Lond., 5, 375, pl. 60, figs. 5a-f. (non M'Coy, 1844).
1874 *Cythere costata* Brady; G. S. Brady, H. W. Crosskey and D. Robertson, Palaeont. Soc. Lond., 166-167, pl. 5, figs. 21-24.
1967 *Baffinicythere costata* (Brady); J. E. Hazel, U.S. Geol. Survey Prof. Paper 564, 17, pl. 2, figs. 7, 12-15, pl. 8, figs. 1-8.
1967 *Baffinicythere howei* nom. nov. J. E. Hazel, J. Paleont., 41, 1284.
1967 *Hermanites costata* (Brady); N. C. Hulings, Crustaceana, 13, 322, pl. 4, figs. 16-17, text-figs. 5A-E, 8M-N.
1975 *Baffinicythere howei* Hazel; J. W. Neale and H. V. Howe, Bull. Amer. Paleont., 65, (282), pl. 2, figs. 10, 12, 13, 15, 17.

Lectotype: Female LV, Hancock Museum no. 1.22.09. (Paralectotype, male LV, no. 1.22.08).
Hunde Islands, Baffin Bay, W Greenland, approx. lat. 68° 52' N, long. 53° 07' W, depth 60-70 fathoms (110-128 metres); Recent.

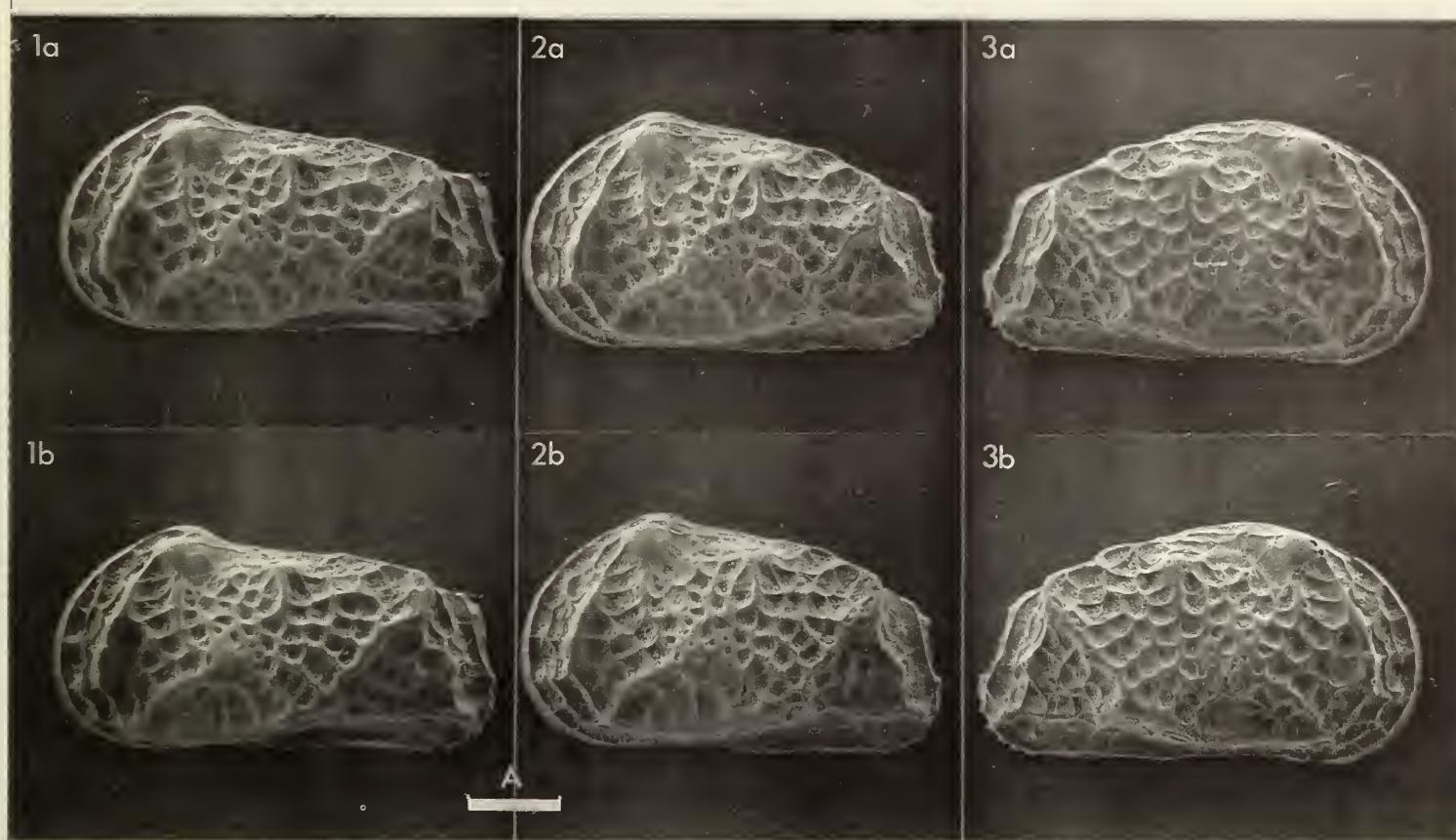
Figured specimens: Hancock Museum nos. 1.22.08 (♂ LV, paralectotype: pl. 10, 54, fig. 1), 1.22.09 (♀ LV, lectotype: pl. 10, 54, fig. 2), 1.22.10 (♂ RV: pl. 10, 56, fig. 2), 1.22.11 (♀ RV: pl. 10, 56, fig. 3), 1.22.12 (♀ car.: pl. 10, 58, fig. 1). British Museum (Natural History) nos. 1983.1 (♀ RV: pl. 10, 54, fig. 3), 1983.2 (♂ RV: pl. 10, 58, figs. 2-4), 1983.3 (♂ LV: pl. 10, 56, fig. 1; pl. 10, 60, figs. 1-2), 1983.4 (♂ RV: text-fig. 1a; appendages: text-figs. 1c, 2c, 3a-d), 1983.5 (♀ RV: text-fig. 1b; appendages: text-figs. 2a, b, d, e), OS.7691 (♂ RV: pl. 10, 60, fig. 3).

The Hancock Museum specimens were taken from the Brady collection; the lectotype and paralectotype from syntypic slide no. 1.10.36 (labelled "Cythere costata (Brady), Hunde Islands"), no. 1.22.10 from slide no. 1.10.34 (from Uddevalla, Sweden, approx. lat. 58° 21' N, long. 11° 56' E), nos. 1.22.11 and 1.22.12 from slide no. 1.10.35 (also from Uddevalla).

Explanation of Plate 10, 56

Fig. 1, ♂ LV, ext. lat. (1983.3; 1,180 µm long); fig. 2, ♂ RV, ext. lat. (1.22.10; 1,180 µm long); fig. 3, ♀ RV, ext. lat. (1.22.11; 1,120 µm long).

Scale A (250 µm; × 50), figs. 1-3.



The Brit. Mus. (Nat. Hist.) specimens **1983.1-3** were taken from Norman collection slides labelled “*Cythere costata*”; **1983.1** (ex slide no. **1911.11.8 M3346**) is from the type locality, **1983.2** and **1983.3** (ex **1911.11.8 M3345**) are from Unst Haaf, Shetland (approx. lat. $61^{\circ} 00' N$, long. $1^{\circ} 30' W$). Nos. **1983.4** and **1983.5**, from Ungava Bay, Labrador (lat. $60^{\circ} 08' N$, long. $67^{\circ} 47' W$), depth 73 m, and off Shannon Island, E Greenland (lat. $75^{\circ} 20' N$, long. $19^{\circ} 00' W$), depth < 200 m, respectively, were kindly provided by Dr J. E. Hazel. No. **OS 7691** was collected by Prof. D. Curry from the Butley Crag (Red Crag Series; pre-Ludhamian stage of the pre-glacial Pleistocene) at Neutral Farm, near Butley, Suffolk, England (approx. lat. $52^{\circ} 05' N$, long. $1^{\circ} 30' E$).

Diagnosis: Carapace large (> 1.00 mm long), strongly reticulate, with prominent sub-marginal curved rib running from just in front of eye-tubercle, converging with antero-ventral margin, and bending upwards posteriorly to meet anterior corner of postero-lateral triangle of ribs.

Remarks: Brady's syntypic material is housed in the Hancock Museum, Newcastle-upon-Tyne, on three separate slides, each containing several disarticulated valves, and numbered **1.10.32**, **1.10.33** and **1.10.36**. We have selected a lectotype from **1.10.36**.

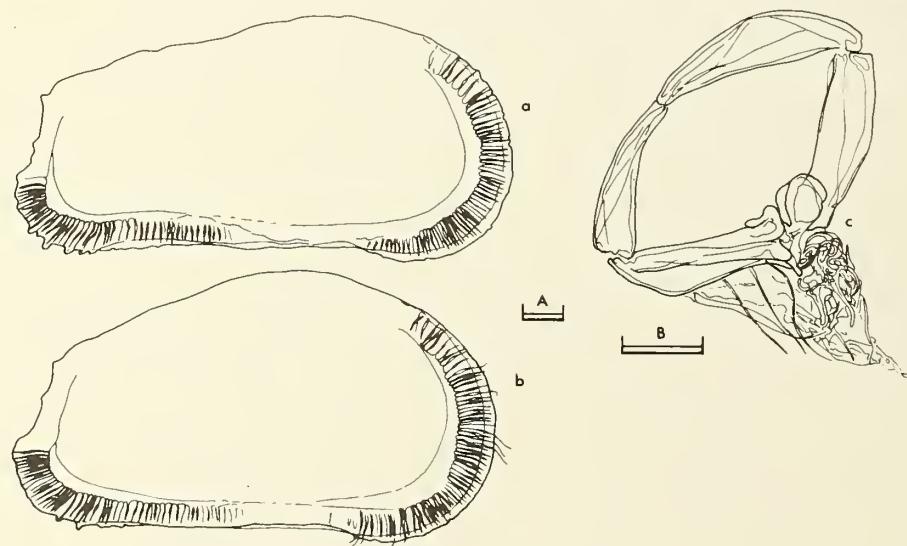
Distribution: Recent: *B. howei* is a characteristic sublittoral marine Arctic species, most abundant in the Arctic Province, but extending south to about $59^{\circ} N$ in the eastern N Atlantic (Norwegian Province) and about $41^{\circ} N$ in the western N Atlantic (Nova Scotian Province), with an approximate depth range of 20-200 m (Hazel, 1967, op. cit.; Neale and Howe, 1975, op. cit.).

Pleistocene: British Isles, including the Bridlington Crag (Hoxnian) of Yorkshire (Brady, Crosskey and Robertson, 1874, op. cit.) and the Red Crag (pre-Ludhamian) of East Anglia (herein). Where abundant, it may be taken to indicate cold temperate to frigid climatic conditions.

Explanation of Plate 10, 58

Fig. 1,♀ car. ext. dors. (**1.22.12**; 1,160 μm long); figs. 2-4,♂ RV (**1983.2**; 1,180 μm long), fig. 2, int. lat., figs. 3-4, anterior and posterior hinge elements.

Scale A (250 μm ; $\times 50$), figs. 1, 2 scale B (100 μm ; $\times 170$), figs. 3, 4.



Explanation of Text-Figure 1

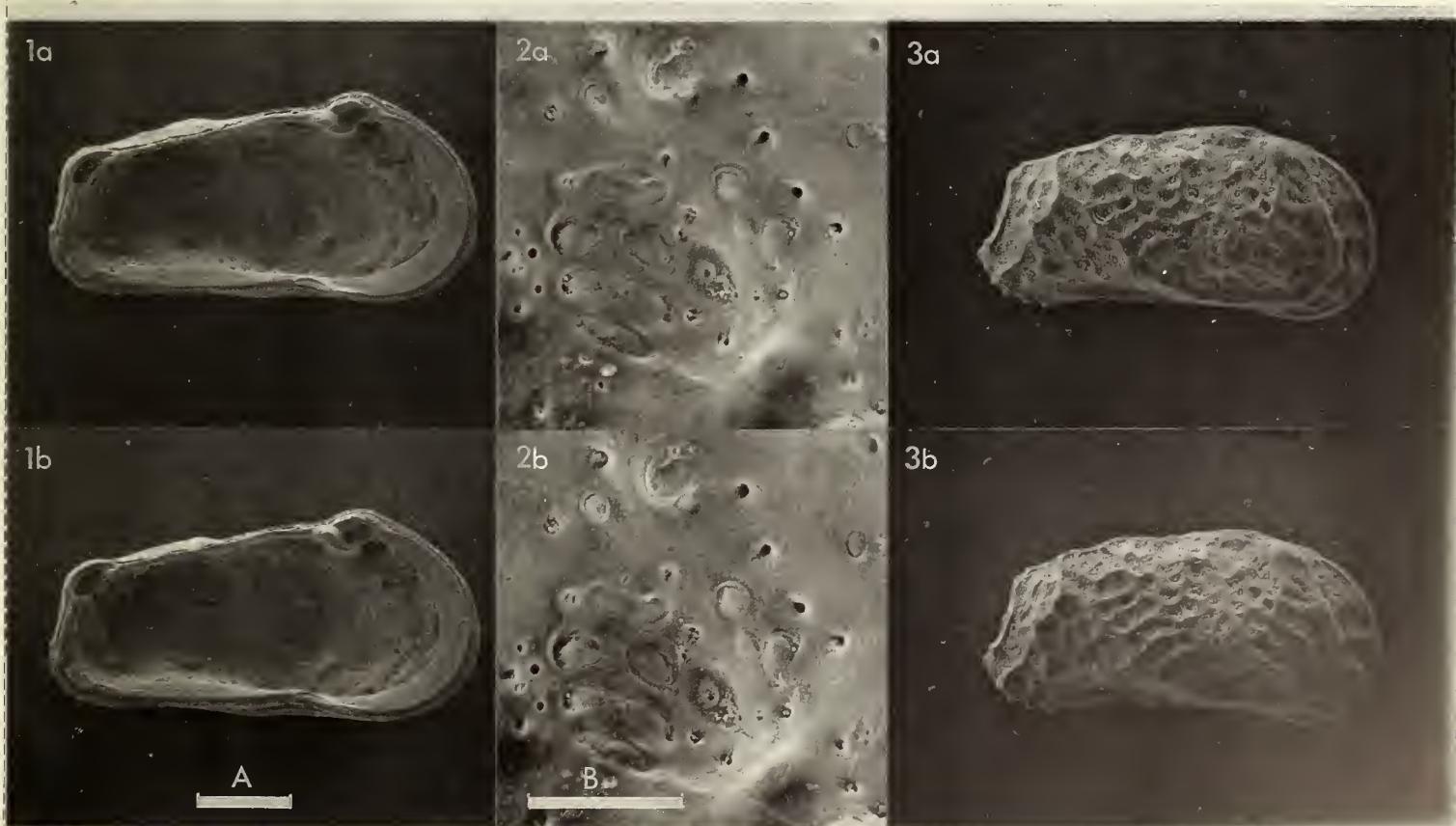
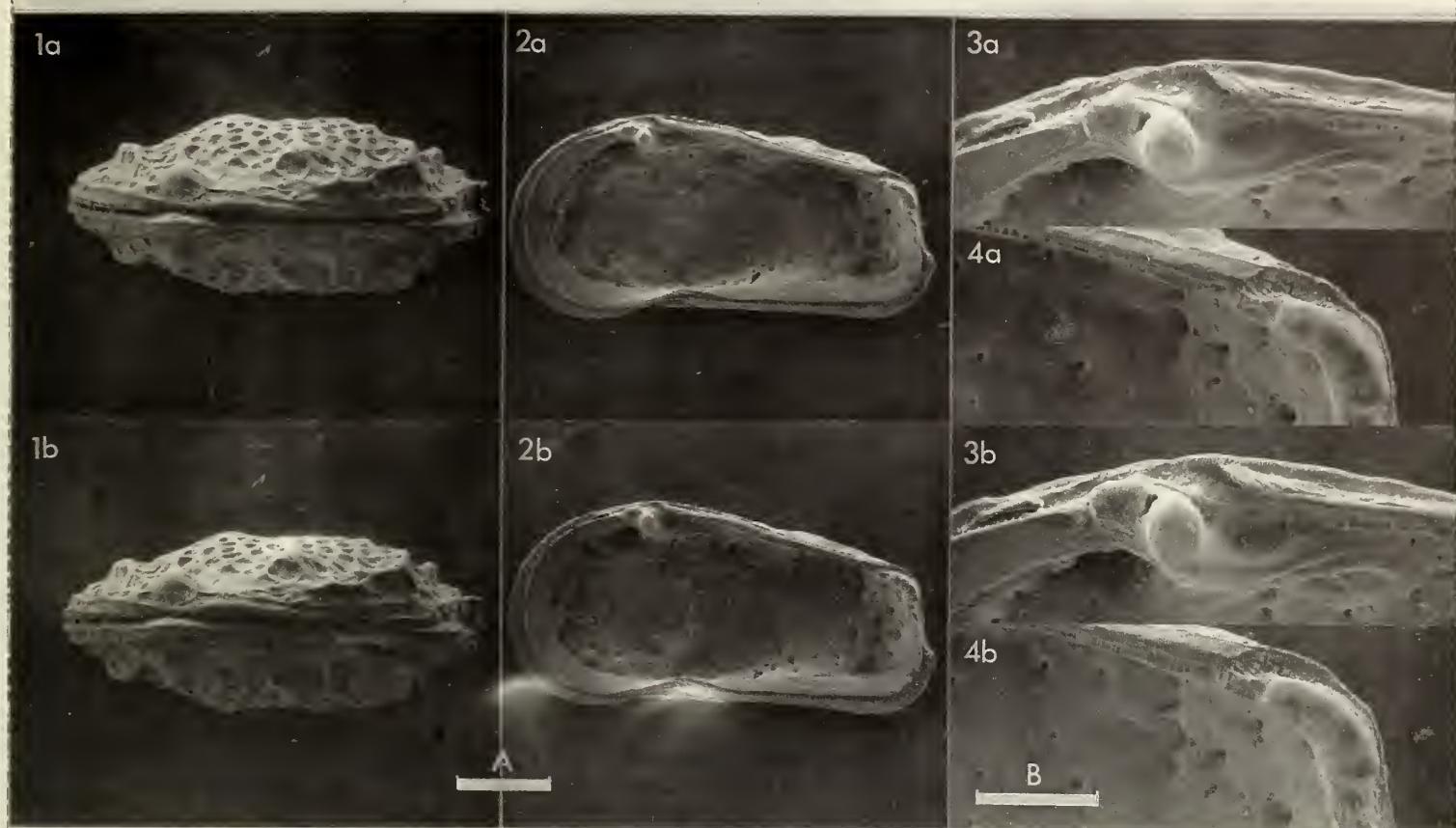
a-b) RV's drawn in transmitted light, showing marginal pore canals; a:♂ (**1983.4**), b:♀ (**1983.5**); scale A = 100 μm .

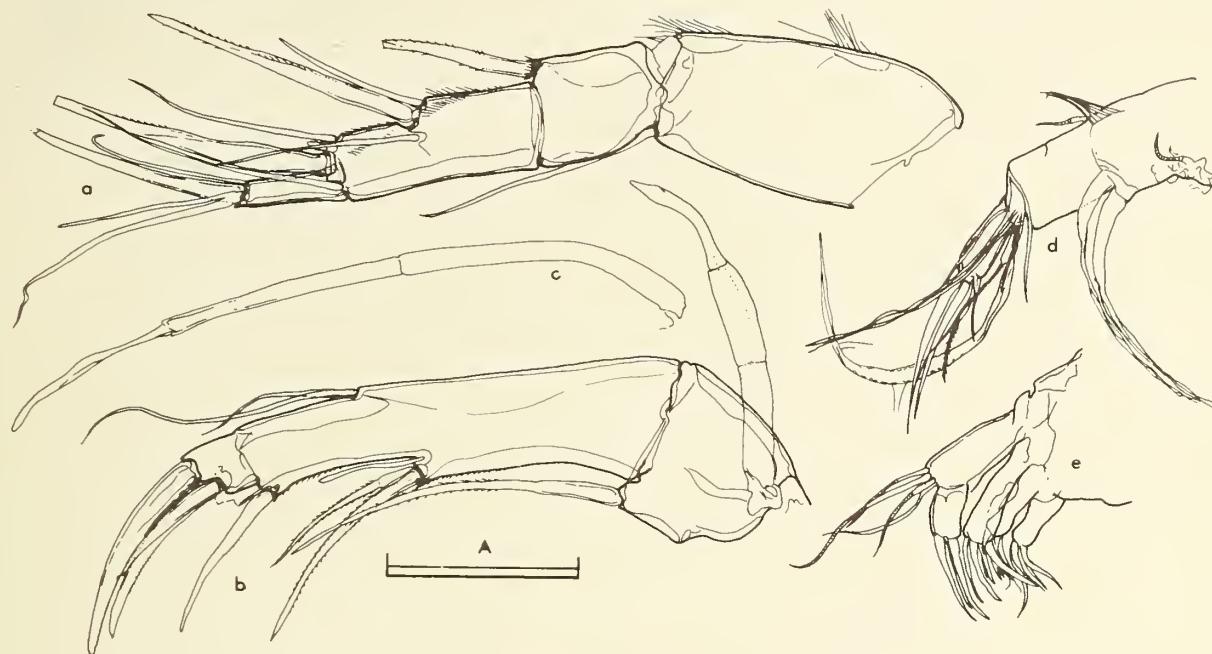
c)♂ copulatory appendage (**1983.4**); scale B = 100 μm .

Explanation of Plate 10, 60

Figs. 1-2,♂ LV (**1983.3**; 1,180 μm long), fig. 1, int. lat., fig. 2, int. musc. sc.; fig. 3,♂ RV, ext. lat. (**OS 7691**; 1,080 μm long).

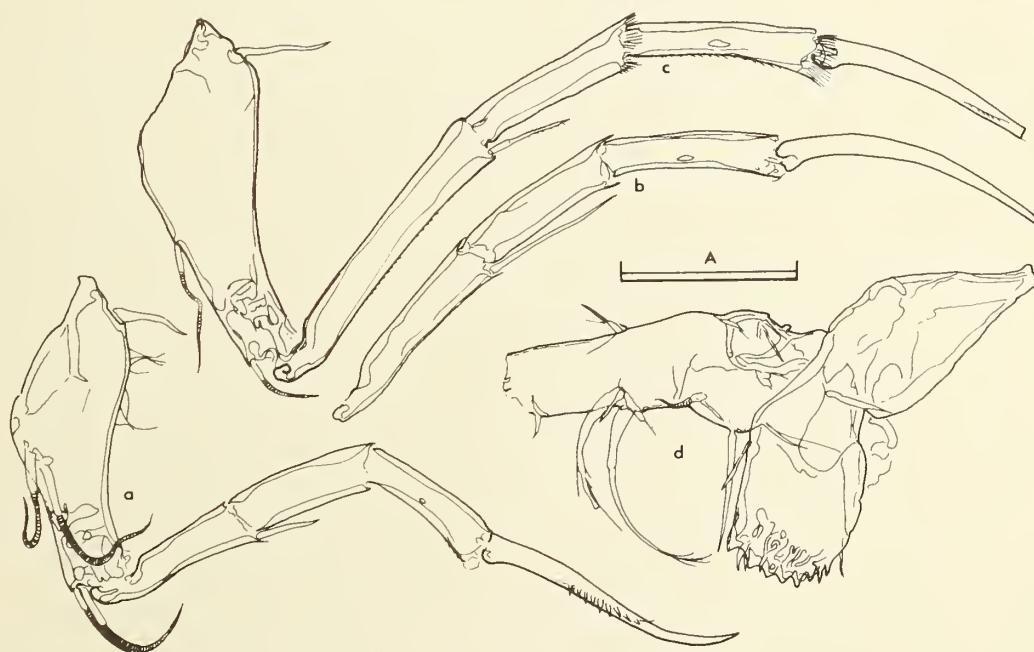
Scale A (250 μm ; $\times 50$), figs. 1,3 scale B (100 μm ; $\times 210$), fig. 2.





Explanation of Text-Figure 2

a, b, d, e) ♀ appendages (1983.5); a: antennula, b: antenna, d: mandibular palp, e: maxillula (palp and masticatory processes only).
c) ♂ spinneret seta (exopodite of antenna) (1983.4).
Scale A = 100 µm.



Explanation of Text-Figure 3

♂ appendages (1983.4); a) first leg, b) second leg (basal podomere absent), c) third leg, d) mandible (distal part of palp absent).
Scale A = 100 µm.

ON *POLYCOPE FORAMINOSA* HASAN sp. nov.

by Manzoor Hasan
(University of Leicester, England)

Polycope foraminosa sp. nov.

Holotype: Brit. Mus. (Nat. Hist.) no. **OS 10132**; RV.

Type locality: Darvel Bay, Malaysia, lat. 04° 44.5' N, long. 118° 30.0' E; Recent.

Derivation of name: Latin, *foraminosus*, full of holes; suggested by the puncta distributed over most of the shell surface.

Figured specimens: Brit. Mus. (Nat. Hist.) nos. **OS 10132** (holotype, RV: Pl. 10, 64, figs. 1, 3; Pl. 10, 66, fig. 1); **OS 10133** (LV: Pl. 10, 64, fig. 2; Pl. 10, 66, figs. 2, 3).

Specimen **OS 10132** (holotype) was collected from a depth of 34 fathoms; **OS 10133** is from lat. 04° 40.2' N, long. 118° 44.0' E, collected from 40 fathoms. Both figured specimens are from Darvel Bay, Malaysia, collected by HMS Dampier in 1965.

Explanation of Plate 10, 64

Fig. 1, RV, ext. lat. (holotype **OS 10132**, 414 μ m long.); fig. 2, LV, ext. lat. (**OS 10133**, 414 μ m long.); fig. 3, RV, ext. median region showing impression of the musc. sc. (holotype **OS 10132**).

Scale A (100 μ m; $\times 170$), figs. 1, 2; scale B (10 μ m; $\times 1026$), fig. 3.

Diagnosis: Rounded or subrounded puncta uniformly cover most of the shell surface. On the mid-ventral margin several delicate carinae branch, each to form a Y-shaped pattern; the stem of the Y is directed away from the margin.

Remarks: The valve is oval and the peripheral carina distinctly developed. Anterior process bears a subdued rostrum. Line of maximum height lies anterior to the mid-length. Line of maximum length passes through the centrally located muscle-scar region. Several delicate carinae are present on the peripheral region. The muscle-scar is typical of the genus. The hinge is short.

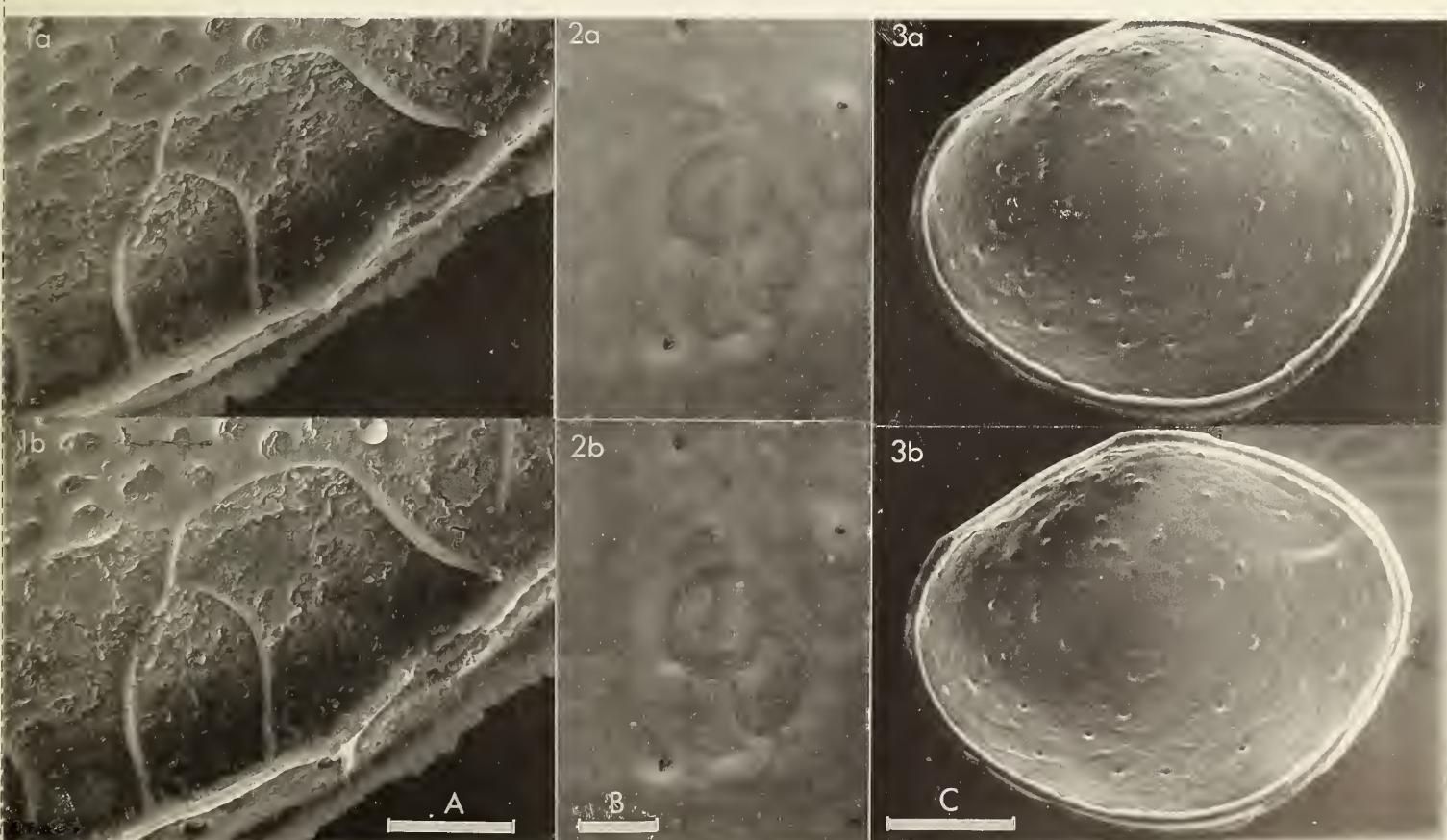
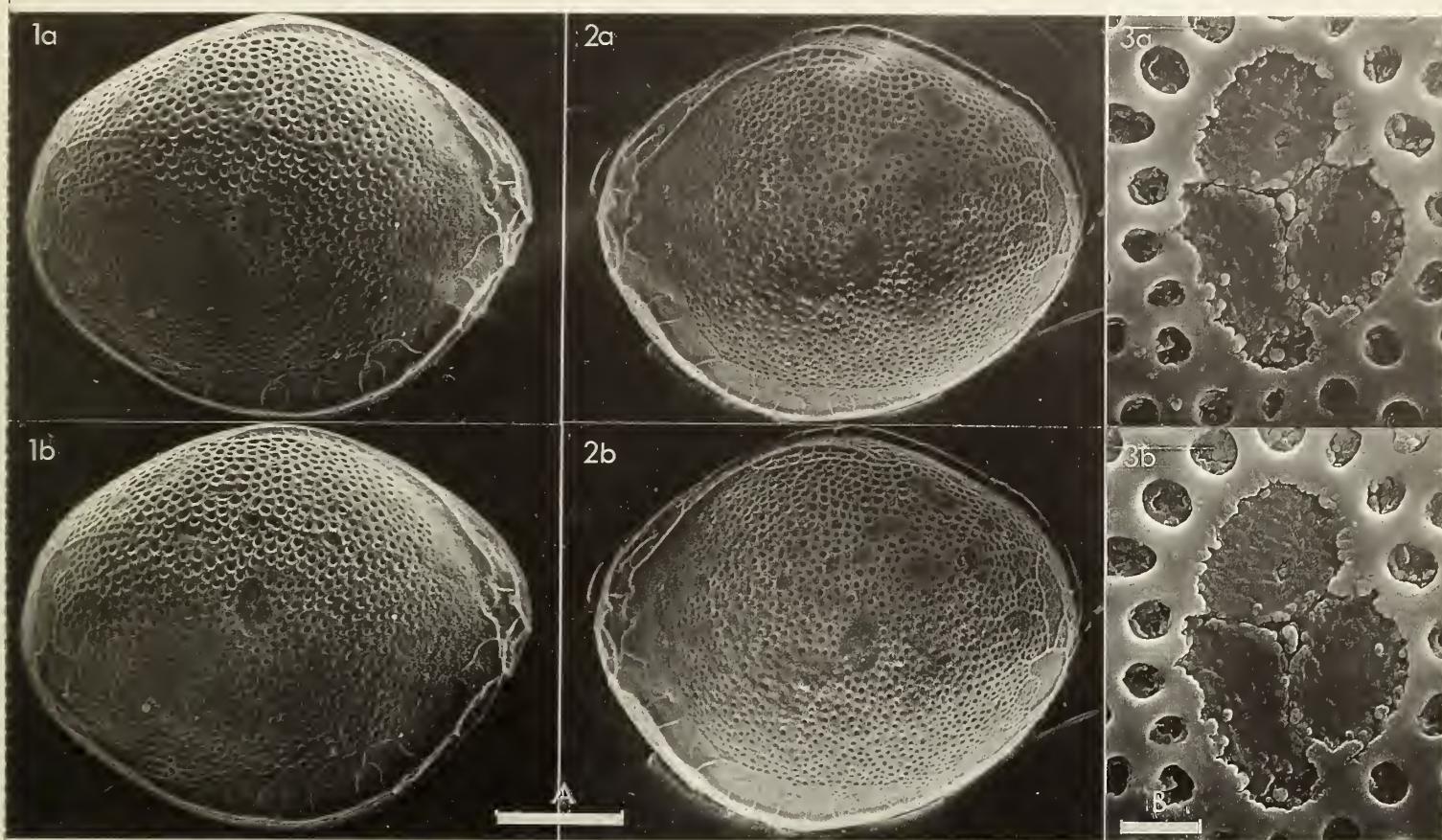
Polycope foraminosa sp. nov. has some similarity with the description of *Polycope punctata* Sars but clearly differs from it in the possession of branched carinae with Y-shaped pattern. Also, well developed rounded and subrounded puncta more uniformly cover most of the shell surface in *P. foraminosa* but in *P. punctata* Sars the puncta are not so well developed and numerous.

Distribution: Known only from Recent, Darvel Bay, Sabah, Malaysia.

Explanation of Plate 10, 66

Fig. 1, RV, mid. vent. margin showing delicate Y-shaped carina (holotype **OS 10132**); fig. 2, LV, int. musc. sc. (**OS 10133**); fig. 3, LV, int. lat. (**OS 10133**).

Scale A (15 μ m; $\times 1026$), fig. 1; scale B (15 μ m \times 659), fig. 2; scale C (100 μ m; $\times 169$), fig. 3.



ON *POLYCOPE CHOANE* HASAN sp. nov.

by Manzoor Hasan
(University of Leicester, England)

Polycope choane sp. nov.

Holotype: Brit. Mus. (Nat. Hist.) no. OS 10112; RV.

Type locality: Darvel Bay, Malaysia, lat. 04° 43.8' N, long. 118° 32.7' E; Recent.

Derivation of name: Greek, *choane*, funnel-shaped hollow; suggested by the presence of funnel pores on the shell surface.

Figured specimens: Brit. Mus. (Nat. Hist.) nos. OS 10112 (RV: Pl. 10, 68, figs. 1, 3; Pl. 10, 70, figs. 1-3), OS 10113 (LV: Pl. 10, 68, fig. 2).

Specimen OS 10112 (holotype) is from 222 ft., collected in 1962. Specimen OS 10113 is from lat. 04° 40.6' N, long. 118° 35.3' E, from 35 fathoms, collected in 1965. Both figured specimens are Recent, from Darvel Bay, Malaysia, collected by HMS Dampier.

Explanation of Plate 10, 68

Fig. 1, RV, ext. lat. (holotype, OS 10112, 439 µm long); fig. 2, LV, ext. lat. (OS 10113, 390 µm long); fig. 3, RV, mid dorsal region showing elongate double pore (holotype, OS 10112).

Scale A (100 µm; × 159), figs. 1, 2; scale B (25 µm; × 375), fig. 3.

Diagnosis: Species of *Polycope* with ornament consisting of delicate dendritic and anastomosing ridges which form characteristic scale-like pattern in the ventral region. Well developed funnel pores are scattered on the shell surface.

Remarks: Valve ovoid. Line of maximum length passes through the region of the muscle-scar. Line of maximum height lies anterior to the mid-length. Funnel pores are rimmed and each pore has a single aperture. However, one specimen (the holotype) has a double-pore in the mid-dorsal region; it is elongate with two apertures separated by a dividing wall. Anterior process is well defined and protrusive. Hinge region is short and narrow. Muscle-scar is typical of the genus.

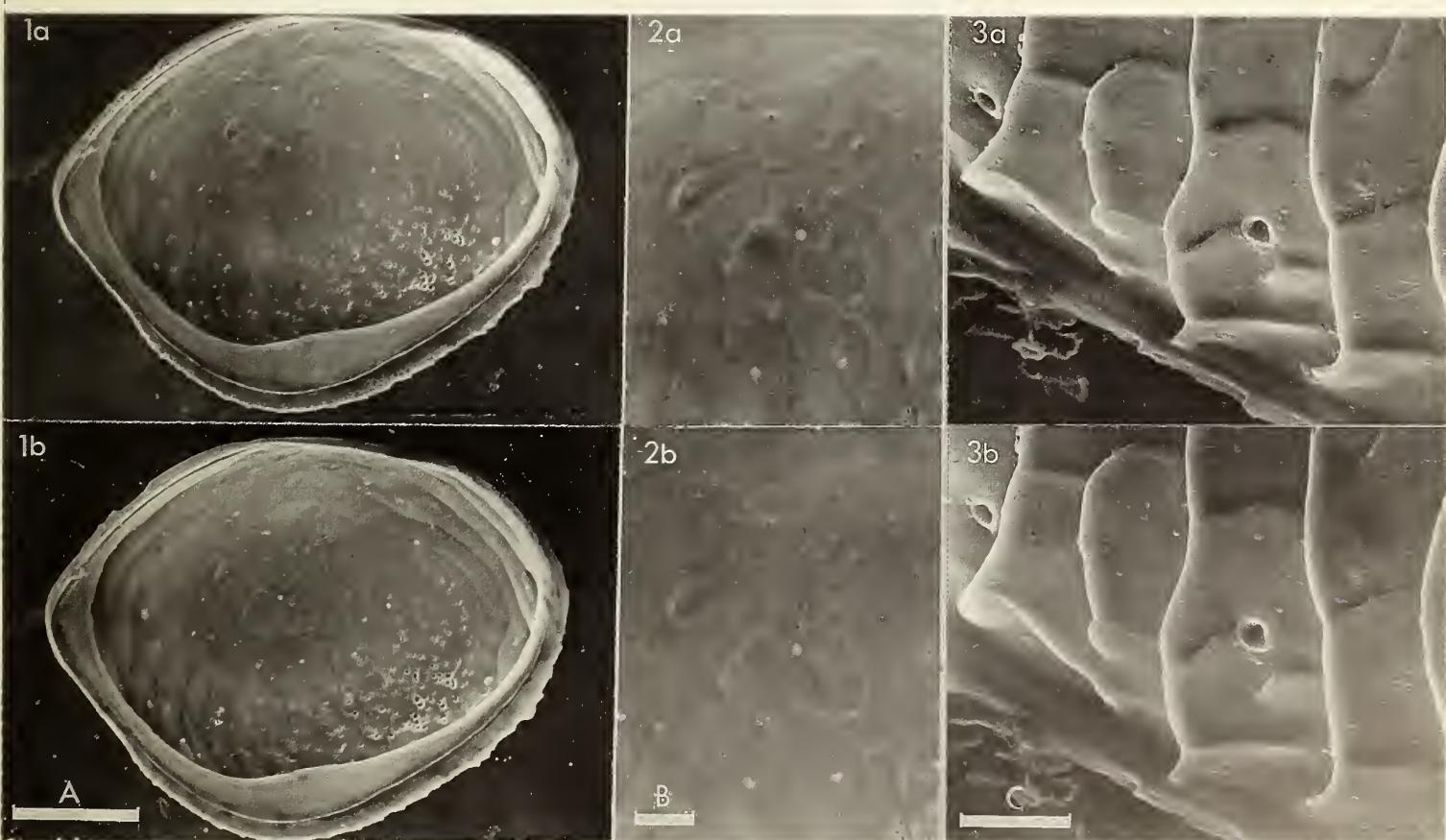
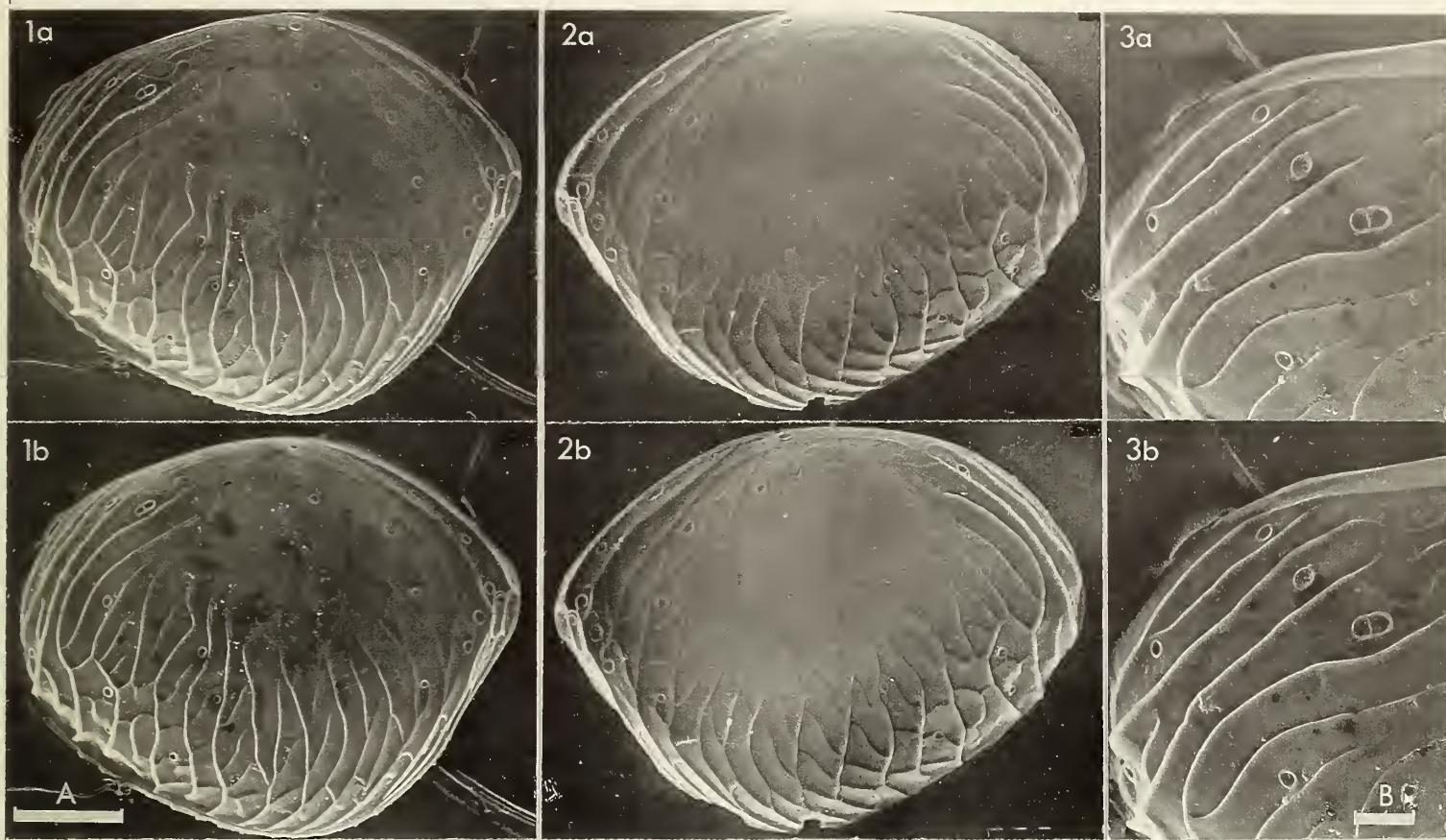
Polycope choane sp. nov. is close to *Polycope striata* Müller (Zool. Stat. Naples Monogr. 1894 (21), 236-237, pl. 8, fig. 24) but is more elongate in outline with distinctly pointed anterior and more narrowly rounded posterior end. Ornamentally the dendritic ridges of *P. choane* cut across secondary ridges ventrally, a feature lacking in *P. striata*.

Distribution: Known only from Recent, Darvel Bay, Sabah, Malaysia.

Explanation of Plate 10, 70

Fig. 1, RV, int. lat. (holotype, OS 10112); fig. 2, RV, int. lat. musc. sc. (holotype, OS 10112); fig. 3, RV, vent., scale-like pattern (holotype, OS 10112).

Scale A (100 µm; × 166), fig. 1; scale B (25 µm; × 332), fig. 2; scale C (25 µm; × 664), fig. 3.



ON *POLYCOPE REGINA* HASAN sp. nov.

by Manzoor Hasan
(University of Leicester, England)

Polycope regina sp. nov.

Holotype: Brit. Mus. (Nat. Hist.) no. OS 10100; LV.

Type locality: Darvel Bay, Malaysia, lat. 04° 38.5' N, long. 118° 39.6' E; Recent.

Derivation of name: Latin, *regina*, queen; suggested by the fancied imagination that it is the beauty queen among *Polycope*.

Figured specimens: Brit. Mus. (Nat. Hist.) nos. OS 10100 (holotype, LV: Pl. 10, 72, figs. 2, 3; Pl. 10, 74, figs. 1, 2); OS 10101 (RV: Pl. 10, 72, fig. 1); OS 10102 (RV: Pl. 10, 74, fig. 3).

Specimen OS 10100 is from the type locality; OS 10101 is from lat. 04° 44.5' N, long. 118° 30.0' E; both from 34 fathoms, collected in 1965. OS 10102 is from lat. 04° 51.6' N, long. 118° 28.2' E, at 186 ft., collected in 1962. All figured specimens are Recent, from Darvel Bay, Malaysia, collected by HMS Dampier.

Explanation of Plate 10, 72

Fig. 1, RV, ext. lat. (OS 10101, 487 µm long); fig. 2, LV, ext. lat. (holotype, OS 10100, 463 µm long); fig. 3, LV, postero-dorsal region showing a minor axial carina along the centre of elongate fossa (holotype, OS 10100).

Scale A (150 µm; × 129), fig. 1; scale B (150 µm; × 136), fig. 2; scale C (25 µm; × 512), fig. 3.

Diagnosis: Species of *Polycope* having distinctly developed polygonal fossae with excavate muri. Fossae bear second order reticulations. A small almost obscure rostral incisure is present at the antero-dorsal margin.

Remarks: The second order reticulation inside the fossae is basically polygonal, sometimes showing a radial pattern, or showing a minor 'axial' carina along the centre of elongate fossae. The dorsal margin is strongly curved. In lateral view the ventral margin of the hinge extends ventrally slightly, obscuring part of the valve interior.

Polycope regina sp. nov. with its polygonal reticulation pattern bears some similarity with the figures of *Polycope orbicularis* Sars, which also has polygonal reticulation. In *P. regina* sp. nov. however, the polygonal fossae are more well developed and have more complex fossae, especially the elongated ones bearing minor 'axial' carina.

P. regina may be distinguished from *P. reticulata* Müller (*Zool. Stat. Naples Monogr.* 1894 (21), 235-6, pl. 8, fig. 20) by having a more oval outline in which the dorsal margin is more distinctly convex, and by having microreticulation within the primary reticulation.

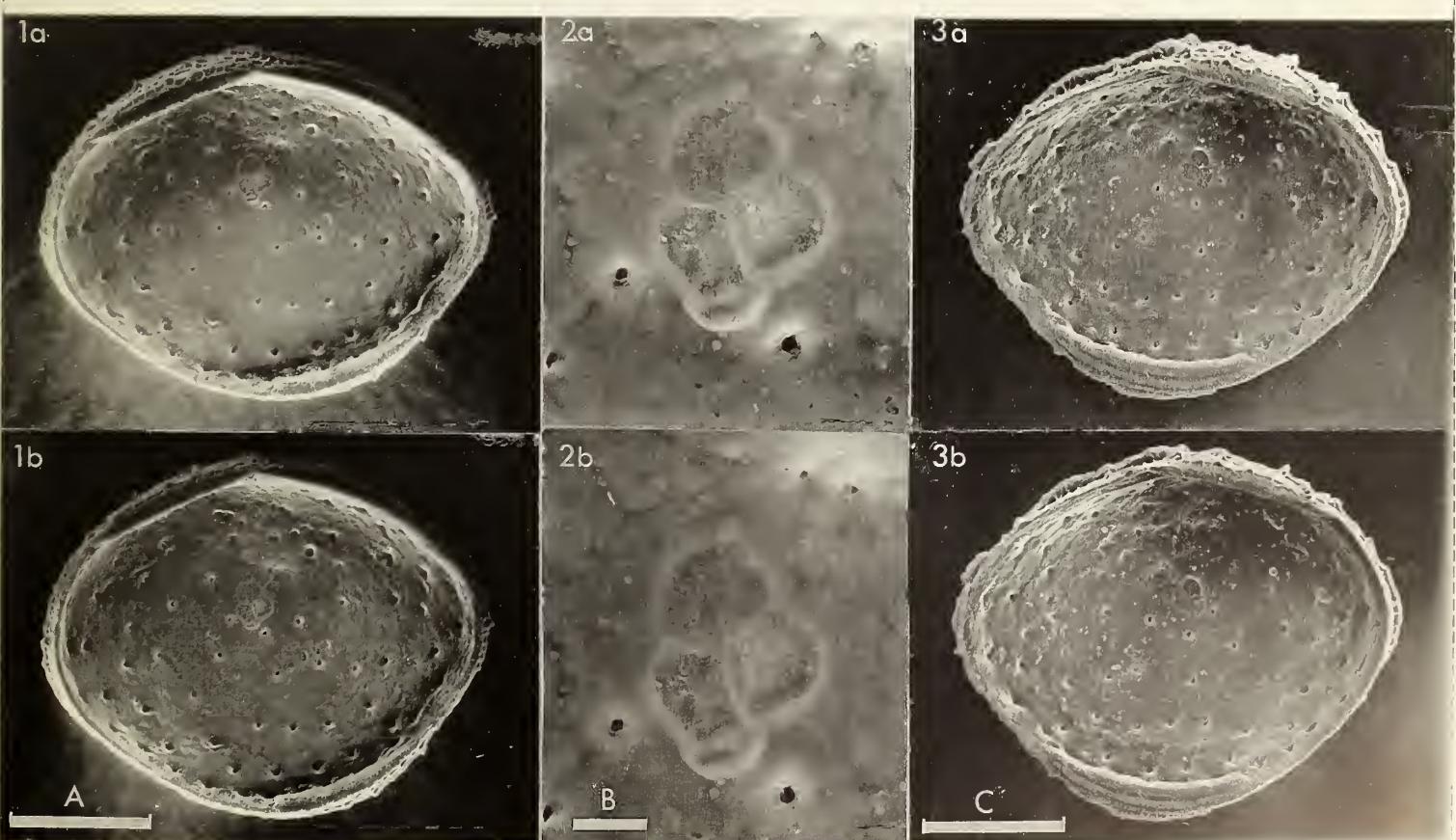
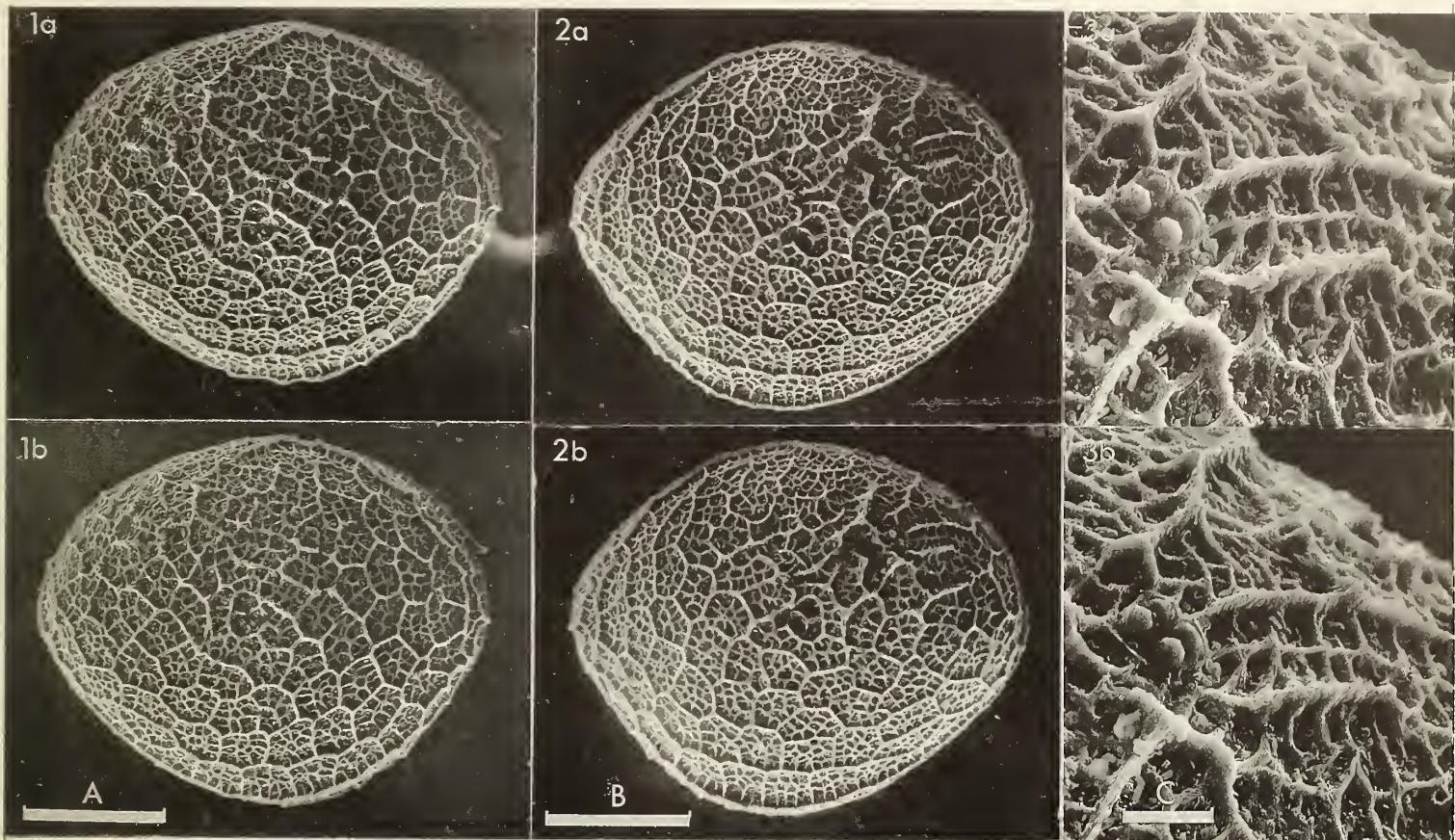
In *P. regina* sp. nov., between the postero-dorsal and mid-posterior regions the growth of a "flower-bud"-like structure with four nodes (Pl. 10, 72, fig. 3) is variable; in some it is poorly developed and in others it is strongly developed.

Distribution: Known only from Recent, Darvel Bay, Sabah, Malaysia.

Explanation of Plate 10, 74

Fig. 1, LV, int. lat. (holotype, OS 10100, 463 µm long); fig. 2, LV, int. lat. musc. sc. (holotype, OS 10100); fig. 3, RV, int. lat. (OS 10102, 439 µm long).

Scale A (150 µm; × 136), fig. 1; scale B (15 µm; × 625), fig. 2; scale C (150 µm; × 141), fig. 3.



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